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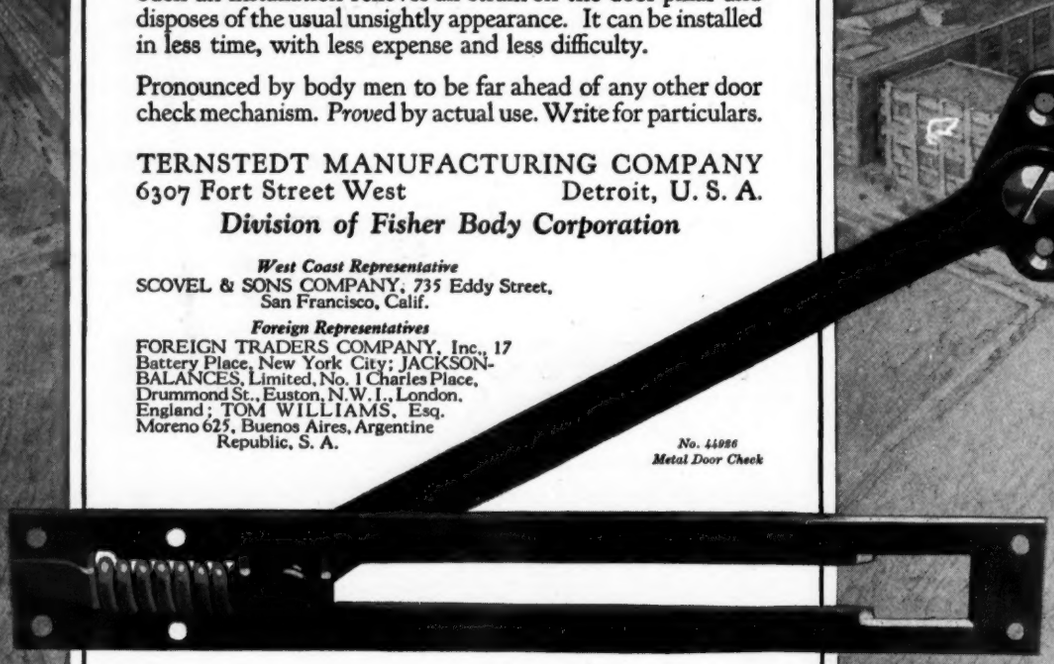

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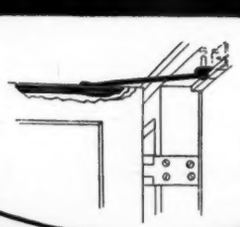

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. L NEW YORK—THURSDAY, MAY 1, 1924 NO. 18

First Quarter Sales Near Record but Behind Expectations

Demand running ahead of last year in some quarters and behind in others. Dealers are well stocked, but used car situation is not especially troublesome.

By James Dalton

REPORTS from most sections of the country indicate that thus far this year there has been nothing radically wrong with the sale of automobiles at retail. Generally speaking, they have fallen short of the marks established for the same period in 1923, but there are a few districts where the reverse appears to be true, and everywhere there are popular lines which are establishing new records.

Sales for the first four months certainly never were larger, except last year, and the volume of business probably would be considered entirely satisfactory were it not for the extravagant hopes which were cultivated rather intensively in the closing quarter of 1923. Prospects for 1924 then were pictured as nothing short of amazing. It was estimated then that the total output for the year would be close to 5,000,000 and that a spring shortage would be inevitable even if factories ran at top speed all winter. Few persons could be found who would admit that sales in 1923 were in any sense abnormal.

DISTRIBUTORS and dealers naturally absorbed at least a part of the enthusiasm which radiated from the factories and they stocked cars to meet the expected spring demand more liberally than they ever did before, but even at that they wern't able to absorb the entire factory output. If winter sales hadn't been unusually heavy and factories had maintained their production schedules, the accumulation of finished products probably would have been staggering. Thanks to the good winter business, however, there is nothing especially alarming in the situation and there will not be unless certain plants continue to over-produce.

Total production in the first quarter of this year was 1,061,000, which was only 93,000 less than the record for all time of 1,154,000, established in the second quarter of 1923. The figure was 187,000 in excess of the 874,000 made in the same period last year and it is highly doubtful if all the new car sales actually lost last spring because of inability to make prompt deliveries exceeded that figure.

THE determination of manufacturers to place themselves in a position where they could provide their dealers with the cars to make immediate deliveries and therefore get a maximum of business, was entirely commendable, but they over-estimated the spring demand and under-estimated the extent to which the selling of motor cars has become a stable, year 'round business. If there had been a sharp slump in sales with the coming of cold weather last fall, which often has been the case, there might be none too many cars on hand now, but there wasn't.

In any consideration of present conditions it should not be forgotten that passenger car production for the six months which began with October and ended with March was 2,041,000. This six month's figure exceeded the total for every year in the history of the industry with the exception of 1920, when it was 2,205,000; 1922, when it was 2,659,000, and 1923, when it was 3,636,000. This mark was set in the two quarters of the year which almost always have been the dullest, both in point of sales and production.

It is small wonder, therefore, that the country has failed to absorb a respectable fraction of the cars turned out. Nobody knows the aggregate of automobiles, new and used, in the hands of factories and dealers, but it undoubtedly is larger than ever before. Notwithstanding this fact April production will not fall so very far short of March.

"Unfavorable spring weather" continues to be the alibi of manufacturers for failure of sales to meet expectations. It undoubtedly has had considerable to do with it, but it is by no means the only factor involved and only time will tell how big a part it has played. The chances are that heavy fall and winter sales, coupled with general uncertainty about the business outlook, has had more to do with it. But if dealers had sold as many cars as were made in the first quarter of 1923 there would still be a surplus of nearly 200,000.

Accumulation of Cars Causes Uneasiness

Whatever depression exists among dealers is not due so much to lack of business as failure to attain the volume they had expected and the necessity of liquidating the stocks they have on hand. The morale of selling organizations is higher when they can't meet the demand for their goods than when they can't get rid of their stocks, even when the volume of sales is identical.

The automotive industry is temperamental. It has become accustomed to an increase in its business each year, and when the increase fails to materialize it feels that something is radically wrong. But production and sales can't go on mounting indefinitely, year in and year out. That fact might as well be accepted. Sooner or later we shall be able to determine what is normal, and sooner or later we shall learn that the seasonal ups and downs are disappearing.

Notwithstanding the relatively heavy accumulation of cars, there is nothing to indicate that dealers are seriously disturbed over the outlook for the year. They are fully alive, however, to the possibility of increasingly unsatisfactory general business conditions for the next few months. They are not unaware that sales which were delayed because of a backward spring may be lost entirely for the present season because of uncertainty on the part of prospects about their earning capacity and consequent buying power for the rest of 1924. This may result in a sales volume in the second quarter less satisfactory than in the first.

Buying Indicates Caution

Nothing is to be gained by trying to blink the fact that the contraction in most lines of activity, which began a few weeks ago, has continued steadily and shows no signs of abating. The so-called key industries are slowing up and buyers are becoming increasingly cautious. As we have pointed out repeatedly, however, there can be no serious or long continued depression when there is nothing to deflate. But anything resembling a depression is serious while it does last.

While speculation concerning what is going to happen to automobile sales in the next few months is more or less idle, considerable valuable information can be derived from a consideration of what has happened thus far, what is going on now and what dealers expect. For that reason, AUTOMOTIVE INDUSTRIES has obtained from its correspondents in the principal trading centers carefully prepared summaries of conditions.

Analysis of these reports shows that in two-thirds of the cities sales have run or are running behind the same period last year. It is significant that the most favorable conditions have prevailed in the largest industrial centers, regardless of their geographical locations, including New York, Detroit, Baltimore, Boston, Indianapolis, Omaha, St. Louis, Philadelphia and Milwaukee. These cities have absorbed motor cars in the last two years like a sponge absorbs water, but if general business contracts, especially building construction, it is scarcely to be expected that sales can be maintained at the same level. For that reason it is extremely unlikely that the volume for the year will exceed last year.

On the other hand, sales have fallen short of last year in all geographical sections, including some large industrial cities, such as Cleveland, Cincinnati, Rochester, Buffalo and Toledo. It is somewhat significant that the discrepancy has been most marked in the southern cities of Louisville, Atlanta, Birmingham and Charlotte; in the Pacific Coast cities of Los Angeles, San Francisco and Seattle, and in cities largely dependent upon agriculture, such as Minneapolis, Kansas City and Des Moines.

Whatever declines there have been in all these areas are easily explainable. In the industrial towns, the gradual curtailment of operations in manufacturing plants has provoked a spirit of caution on the part of that preponderant section of the population dependent upon factories for the livelihood.

Business Backwardness Defers Sales

The Pacific Coast escaped much more lightly than did other sections in the depression which began in 1920 and was buying automobiles in large numbers when trade was exceedingly slack almost everywhere else. Deflation there did not reach the extremes it did elsewhere. Factors which are comparatively local, such as the foot and mouth disease in California and a decline in the demand for Washington lumber, are chiefly responsible for the backwardness of general business, but the keen edge of the appetite for motor cars has been satisfied and a majority of the prospects can defer buying for a while.

The Northwest and the Middle West were hit harder than any other parts of the country by the collapse of values which began in 1920, and they never have recovered their normal purchasing power. They never will until the prices of farm products go up and the prices of commodities farmers buy come down. Thousands of wheat farmers are in a distressing plight and many of them have lost their farms through mortgage foreclosures.

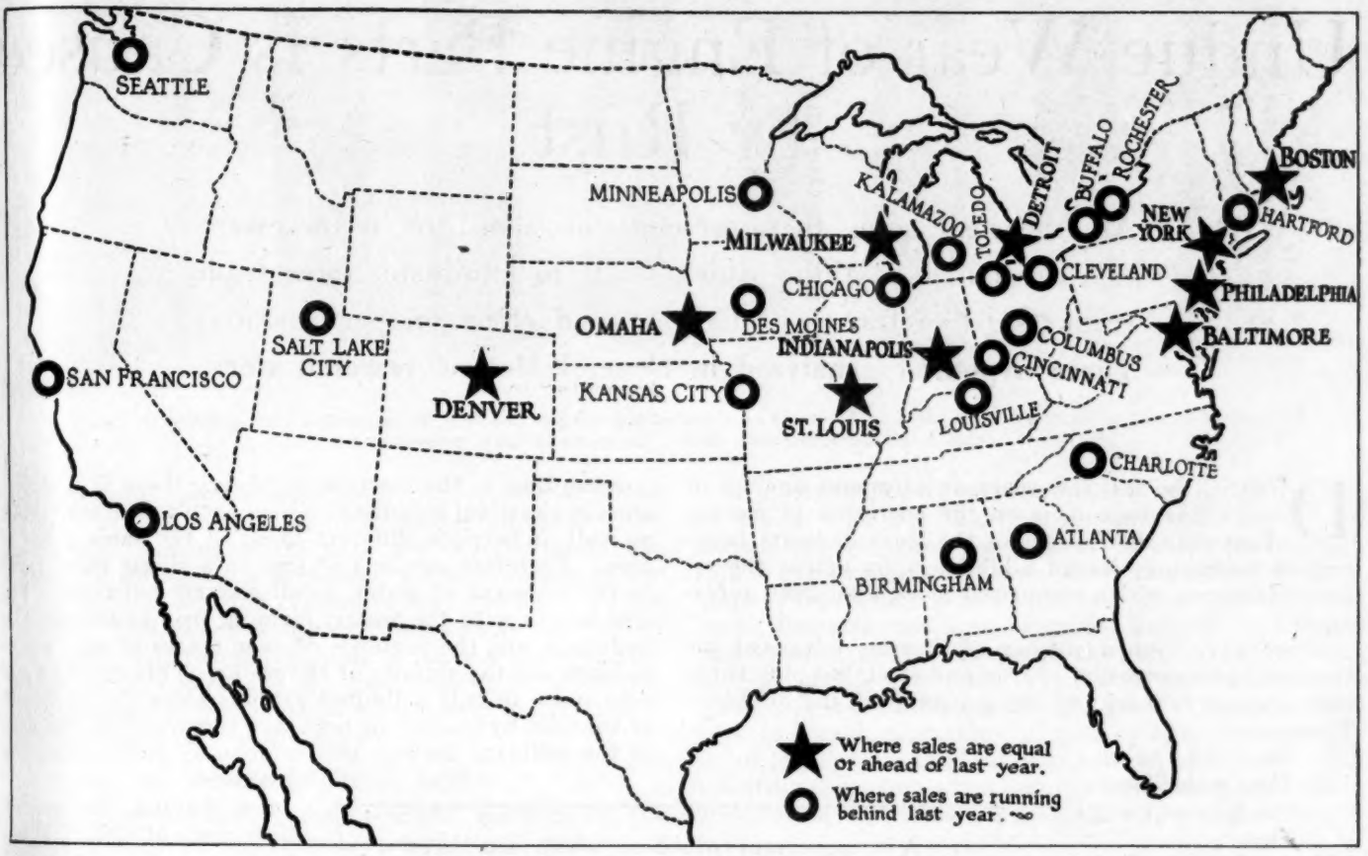
So far as the South is concerned, the prosperity resulting from a world shortage of cotton already has been discounted, notwithstanding high prices. Increased values were not sufficient to offset the ravages of the boll weevil. The industrial cities are in much the same plight as their neighbors in the North and there are few towns below Mason and Dixon's line which are not more or less dependent upon some form of agriculture.

Low-Priced Lines Moving Best

One point which stands out in a nation-wide analysis of sales is that it is the low-priced lines which are going best. In almost every city where the number of units is larger than last year, the dollar value is no greater because of this condition. Manufacturers in this field probably will be able to increase their volume for the year as a whole, but they are likely to fall far short of the marks they set when fixing tentative schedules. Probably no other price class will show a gain and the preponderance of sales in the class under $500 promises to be greater than ever.

A gratifying feature of the situation up to this time is that used car stocks appear to be smaller in most places than they were a year ago, with a somewhat better

The Sales Map as it Looks Today



demand for them. There are indications here and there, however, that in their eagnerness to liquidate new car stocks dealers are beginning to make extravagant trading allowances. Used car conditions seem to be best in places where dealers are operating under some one of the plans recommended by the National Automobile Dealers' Association.

Survey Discloses Spottiness

The survey discloses that sales conditions are spotty in almost every city, with dealers in certain lines doing a better business than they did a year ago. These lines are not by any means the same in all places, although there are a half dozen in the medium and higher priced groups which are making splendid records almost everywhere. Nevertheless, the complaint is general that even where sales are better than in the corresponding period of 1923, dealers are not able to absorb increased factory output.

A considerable number of dealers are discontented because, when they accepted their quotas for this year, they failed to take into consideration the sales they would lose through the increase in the number of neighborhood dealers or agents. From the factory point of view the volume may be entirely satisfactory, but the dealers who over-stocked are grumbling.

Bankers here and there, especially in agricultural districts, are beginning to tighten up on loans to automotive merchants. Many of them never have been able to throw off a certain amount of uncertainty about the economic value of the motor car, and with the contraction in general business they are taking the position that they must guard their dealer customers against overextending themselves.

This hesitancy has been increased in a good many areas by local conditions. In California, for example, the quarantine placed against its products by neighboring States has resulted in keeping trainloads of fruit on railroad sidings until it rotted, and bankers are anticipating the necessity for increased loans to agricultural interests.

New England dealers are suffering somewhat because of strikes and part-time operations in textile centers. Boston reports that a good many persons who have ordered cars and made deposits on them are stalling off delivery, usually giving the weather as an excuse, but in reality chiefly because they fear worse industrial conditions in the near future.

Fully discounting all other reasons, however, the backward spring undoubtedly has had a good deal to do with slowing up sales. In Des Moines, where business is off 50 per cent as compared with last year, bad weather and poor roads are partly at fault, although the unsatisfactory economic position of farmers is mainly responsible. Much the same conditions prevail in the Louisville territory. An increase in sales in Omaha, on the other hand, is attributed to an ideal spring.

Dealers and Distributors Speak Frankly

Distributors and dealers are by no means blind to changing business conditions, however, and they are more frank than manufacturers in their discussion of the subject. The statement of the correspondent in Kansas City is fairly typical in this respect:

"The weather cannot carry all the blame," he says. "Some is due to the hesitancy of the public to spend money. Many prospects, known to be able to buy, have kept putting off the salesmen from month to month. Retail sales in the rural districts are expected to increase next month when the fine crop prospects are further verified, but country bankers intimate that farmers will need all their crop money to pay their debts."

On the same subject the Minneapolis correspondent

(*Continued on page* 988)

Undue Wear of Engine Parts Is Caused by Rust

All theories agree that presence of moisture is necessary to corrosion. Anything which tends to eliminate water from crankcase, therefore, will have a good effect on performance. Three hypotheses analyzed in General Motors' research work.

DURING the last few years an enormous amount of work has been done on the corrosion of metals. Last year the Library of the Massachusetts Institute of Technology issued a bibliography listing the recent literature, which comprised more than 2000 references.

There have been a number of theories advanced for the rusting or corrosion of iron and steel, but only three are seriously considered by students of the problem. These are:

1. The Acid Theory.
2. The Oxide Theory.
3. The Electrolytic Theory.

According to all three theories the presence of water is necessary, and in its absence corrosion cannot take place. Iron rust is a compound consisting of 75 per cent iron oxide and 25 per cent water. This water is chemically combined, forming dry iron rust.

Until recently the acid theory was the one most generally accepted. According to this theory, rusting of iron cannot take place except in the presence of both water and an acid, but the presence of such a weak acid as the carbonic acid or carbon dioxide of the air is thought sufficient. The solution of water and acid dissolves the iron, forming an iron-acid compound. This compound reacts with the water, forming iron rust and liberating the acid, which can again go through the same reactions.

According to the oxide theory, the iron reacts with oxygen to form iron oxide. This iron oxide reacts with the water to form iron rust. This oxide theory is without doubt the true explanation of many cases of corrosion of metals. For example, lead acetate, or sugar of lead, is a compound made from acetic acid and lead. Lead will dissolve only very slowly in acetic acid, but in the presence of the oxygen of the air lead oxide is formed and this unites very easily with acetic acid to form lead acetate.

The objection to the first two theories is that iron rust can be formed from water, iron and acid without oxygen or from water, iron and oxygen without acid. The electrolytic theory covers both cases, acid corrosion and oxide corrosion, and combines them with other cases of corrosion in one broad explanation.

AN important problem which has been given relatively little attention is discussed in this article which is based on recent investigations completed by the General Motors Research Corporation at Dayton.

The data were compiled by E. S. Patch and was reported to the general technical committee of the General Motors Corporation by H. C. Mougey.

The photographs shown are taken from a variety of engines including some of those used in General Motors' cars and others used in competitive lines.

According to the electrolytic theory there is a difference in electrical potential between iron and other metals as well as between different areas of the same piece of iron. Therefore portions of iron in a single piece form, in the presence of water, small electric batteries. The iron reacts with the water, forming iron hydroxide and hydrogen, and the presence of even traces of acid greatly increases the activity of the water. This reaction can take place to only a limited extent unless the hydrogen or the iron hydroxide, or both, are removed. In the case of the ordinary battery this is done by discharging the hydrogen on other surfaces having the proper difference of electrical potential. In the presence of oxygen the hydrogen is removed by combining to form water.

Thus we see that water is necessary for the corrosion of iron, and that either oxygen or acid will accelerate the corrosive action of water on iron.

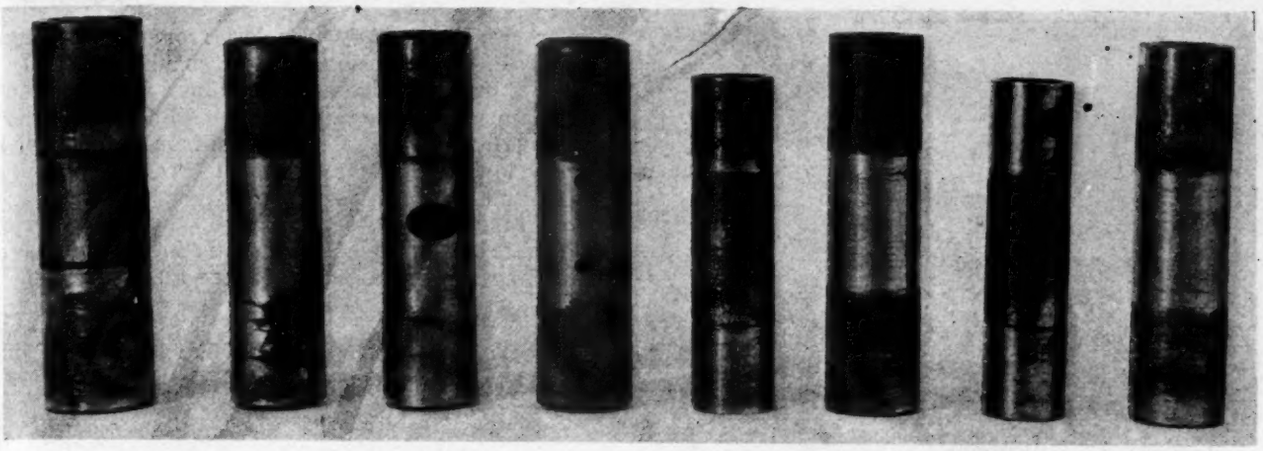
During the past few years we have frequently had our attention called to corrosion of parts inclosed in the crankcase and an apparently rapid wear of all rubbing surfaces, including cylinder walls. In very bad cases the parts actually appear pitted and corroded, while in the milder cases what appears to be rapid wear is all that can be noticed. A number of examples of bad cases of pitting and corrosion have been photographed.

Large Amount of Water Produced

When gasoline is burned in the cylinder of an engine the resulting products of combustion are carbon dioxide and water vapor or steam. If all of the water vapor thus formed should be condensed, slightly over one gallon of water would be formed from each gallon of gasoline burned in the engine. In fact, it has been proposed to condense this water from engines driving dirigible balloons to make up for the loss of weight caused by the burning of the fuel.

It is this water which is responsible for the rusting of muffler tail pipes, and it may be seen at this point soon after starting the engine on a cold day.

In all engines a small proportion of these products of combustion leak past the pistons and enter the crank-



Effects of pitting and corrosion of exposed engine parts such as those shown above are receiving the attention of engineers who have investigated and are seeking a cure

case, the total amount being roughly proportional to the quantity of gasoline burned. The large proportion of the gases thus leaking to the case are expelled from the crankcase through the breather. However, some of the steam passing into the crankcase may condense on the relatively cold inside walls and thence drop into the oil pan. This is particularly liable to happen if the engine is adequately cooled and the condensation is, of course, much greater in winter than in summer, as the crankcase walls are then much cooler.

Forms Sulphuric Acid

All motor gasoline, either straight gasoline or the blends of gasoline and benzol, contain small amounts of sulphur. This sulphur, on burning, forms sulphur dioxide and sulphur trioxide, and these products, reacting with the water of combustion, form sulphurous and sulphuric acids. These products, leaking past the piston rings with the other products of combustion, cause the water, condensed in the crankcase, to be acid in reaction and therefore much more corrosive. The sulphur as it occurs in the unburned fuel is not acid, and cannot be detected by any simple test. The more sulphur the fuel contains, the greater the amount of acid which would be formed by its burning, and the greater the danger from corrosion.

This formation of sulphuric acid from burning sulphur in motor fuels is well known. In the September, 1921, issue of "Lubrication," a magazine published by the Texas Company, the following sentences on this subject are found: "Fuel oils sometimes contain sufficient sulphur to form sulphuric acid in the exhaust due to the water present. As long as the gases are hot enough to keep water vapor (a product of combustion) from condensing, no harm will result, but when an engine is stopped and allowed to cool, water will collect on the cool metal and the acid formed will cause serious pitting."

The Federal Specifications Board, which draws up specifications for fuel and lubricants for use by the various Government departments, has recognized this evil of high sulphur in gasoline and specifies that the fuel shall not contain more than 0.1 per cent sulphur. Unfortunately the method given for determining the sulphur (520.1) is not accurate and does not determine all the sulphur in the fuel.

As a result, it is possible for fuels with almost 0.2 per cent sulphur to meet the Government specifications. However, the Government method for determining sulphur in fuel oil (520.21) is accurate and does determine the total sulphur present.

In most samples of gasoline examined by us the sulphur has been less than 0.1 per cent. Many blended fuels contain higher percentages of sulphur, although this is not true in all cases. There is no reason why a sulphur-free benzol should not be a generally desirable fuel. However, we have examined samples of blended benzol, sold for fuel, in which the sulphur content was as high as 0.75 per cent. Frequently we have encountered samples containing 0.35 per cent. This proportion will, in a tank containing 15 gal., or approximately 100 lb. of fuel, give a total sulphur content of 0.35 lb. This quantity of sulphur, after burning and uniting with water, would form approximately 1 lb. of 100 per cent sulphuric acid.

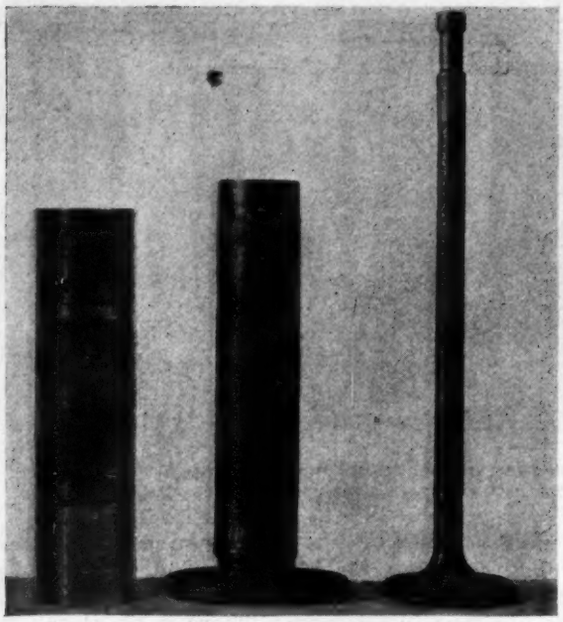
If the attendant at the filling station would deliver into the engine 1 lb. of 100 per cent sulphuric acid with every tank of fuel, the owner would soon register a protest and locate a new filling station. At present, when using a fuel containing enough sulphur to make 1 lb. of sulphuric acid per tank of fuel, the owner frequently has trouble with corrosion or apparently rapid wear, and he blames the motor car manufacturer.

A number of tests have been made to determine the proportion of sulphur in the fuel that is actually converted to sulphurous and sulphuric acids by burning in the combustion chamber. These acids have been extracted from the exhaust gases by bubbling them through alkaline solutions, and on the average about half as much acid was found as would have been formed by a complete conversion of the sulphur in the fuel burned to sulphurous and sulphuric acids.

Of the acid actually formed, only a small amount leaks past the piston rings into the crankcase, as most of the exhaust gases are discharged through the exhaust pipes.

Sulphur Difficult to Detect

However, a very small amount of acid added to water in the crankcase can greatly increase its tendency to cause the iron to rust or corrode. On investigating cases of corrosion due to water in the crankcase being made more active by the formation of acid from the sulphur in the fuel, both automobile engineers and lubricating engineers have sometimes been misled by the fact that no acid could be found in either the fuel or oil used or even in the diluted oil in the crankcase, and samples of bright steel and copper have been immersed in the fuel with no signs of corrosion. Such results are to be expected, since sulphur in the form in which it occurs in most automobile fuels is not corrosive or acid, and does not become acid until after being burned and the products of combustion have combined with water.



Specimens showing rust on engine parts

The absence of acid or even of soluble iron compounds in the water mixed with the oil in the crankcase is due to the fact that the acid in the water very rapidly combines with the iron in the rubbing surfaces to form basic iron sulphate, which is insoluble in water. Thus both iron compounds and acid are not found in the water. However, the iron and sulphuric acid compounds may be found in the pits in badly corroded parts, and in the sludge in the bottom of the crankcase, if the corrosion was stimulated by acid formed from sulphur in the fuel. For example, the analyses given below on the corroded material scraped from the valve tappets, piston pins and exhaust valve stems, taken from cars using high sulphur fuels, show appreciable amounts of sulphur compounds.

	Corroded Material Scraped From		
	Valve Tappet	Piston Pin	Exhaust Valve Stem
Ferric Oxide (Fe_2O_3)	63.7%	40.35%	37.82%
Sulphur Trioxide (SO_3)	2.05%	7.38%	2.72%

Although it is desirable to have fuels as low in sulphur as possible, the automobile engineer has very little control of the fuel. He should, therefore, attempt to make his car operate on the worst fuel likely to be used. Since water is necessary for corrosion, anything that reduces or eliminates water from the crankcase is a great help. This is shown by the fact that cars operating under conditions which decrease the amount of water in the crankcase have less trouble due to corrosion than those operating with water in the crankcase regardless of the fuel used.

Analysis of Crankcase Oils

Below are given the results of analyses of oils taken from the crankcases of engines of the same make operating in a district where high sulphur fuel was used. Samples 1, 2, 3 and 4 are from cars operated under unfavorable conditions, so that water tended to collect in the crankcases. Samples 5, 6, 7, 8 and 9 are from cars operated under conditions tending to evaporate the water from the crankcases as fast as it was formed. All samples except 2 and 4 are from the oil as circulated by the pumps. Sample 2 is the sludge from the oil from sample 1, and sample 4 is the sludge from the oil from sample 3.

In none of these crankcase oils was over 0.5 per cent silicon found, but in some cases large amounts of iron oxide were found. Any iron lost from the rubbing surfaces by either corrosion or wear should be found either in the oil or the sludge as iron oxide. Sand or road dust would appear in the analysis as silicon, and the fact that in all samples tested the silicon content was extremely low is an indication that the large amounts of iron found in some cases came from corrosion rather than abrasion. In these crankcase oils, high percentages of iron are also associated with high percentages of water, and this is further evidence along the same line.

Analysis of Crankcase Oils

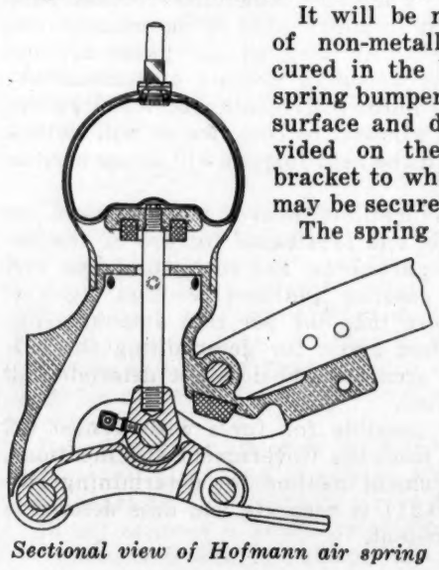
Sample No.	Water	Total Dilution	Iron Oxide
1	6%	30%	1.39%
2	8%	22%	3.57%
3	10%	47%	1.70%
4	7%	22%	2.02%
5	Nil	35%	0.097%
6	Nil	24%	0.239%
7	Nil	30%	0.180%
8	1.5%	22%	0.137%
9	Nil	14%	0.164%

Supplementary Air Spring Designed by Great Pianist

SUPPLEMENTARY springs of the pneumatic type, manufactured by the Stevens Mfg. Co. of Lowell, Mass., are the invention of Josef Hofmann, the pianist, and ten thousand of them are said to be in use in Europe. A sectional view of the device is shown herewith.

As may be seen from the drawing, to the rear end of the frame sidebar is secured a bracket of unusual form, which, in addition to having the rear end of the rear spring shackled to it, has an upward extension to which a nickel-plated steel sphere is secured by screws. Within this sphere there is a rubber ball fitted with a Schrader valve, the stem of which extends through an opening at the top of the sphere. Air pressure of from 30 to 45 lb. per square inch is pumped up in this ball.

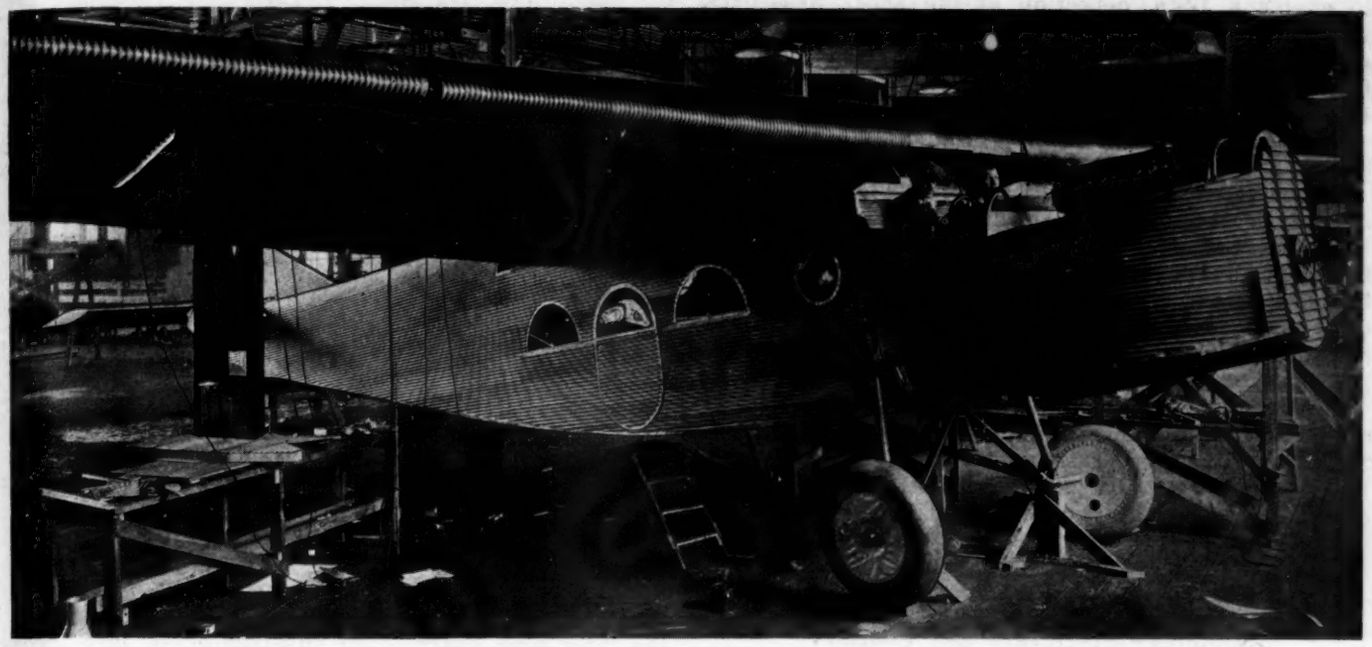
Against the lower part of the rubber ball presses a plunger whose stem extends downwardly and is pivoted to the shackle at a point somewhat closer to its free than its fixed end. It is obvious that, as the pressure carried by the spring increases the rubber ball will compress more, thus permitting the rear end of the spring to approach more closely to the end of the frame sidebar. Thus the range of vertical travel of the frame under a given change in load on the spring is increased and the suspension is rendered more flexible.



Sectional view of Hofmann air spring

It will be noticed that a block of non-metallic material is secured in the bracket to act as a spring bumper or stop, and a plain surface and drilled hole are provided on the rear side of the bracket to which the rear bumper may be secured.

The spring illustrated is known as Model 2. In another model (6) the load is transmitted from the frame sidebar to the rear end of the rear spring partly by air pressure and partly by the pressure of a coiled compression spring.



Stout Air Pullman nearing completion, note detachable wing tips. The front unit including the engine is also quickly detachable

Stout All-Metal Monoplane Is Designed Specially for Commercial Use

Carries fuel for average flight of 4½ hours. Equipped with a 400 hp. Liberty engine, estimated speed is 110 m.p.h. Various parts can be removed easily for maintenance purposes. Three bulkheads between passengers and the powerplant deaden noise.

By J. Edward Schipper

PRELIMINARY tests of the new Stout all-metal "air pullman" have just been completed. The new plane in its first flight climbed one mile in 12 min. and showed a speed of 112 m.p.h. under a 1-ton load.

The Stout product is a commercial type of monoplane capable of carrying eight passengers, including the pilot, on long trips, or ten passengers, including pilot, on short trips. It carries fuel for an average flight of 4½ hr. and, when equipped with a Liberty 400-hp. engine, has an estimated speed of 110 m.p.h. The fuel is carried in two 75-gal. tanks in the wings. The plane is 45 ft. long, has a span of 58 ft. and an estimated useful load of 2000 lb.

This plane has been designed throughout for commercial service. There are two pilot seats arranged for dual control, more than the usual amount of space being allotted to each pilot. One of the features of the plane tending to make it suitable for commercial work, is the fact that the entire power plant including engine, radiator, propeller, instrument board and oil tank are removable by disconnecting four bolts and an outside gas line. The designer believes that it is no more logical to tie up a plane because of engine trouble than it would be to tie up a railroad train to repair the locomotive.

Another valuable commercial feature is the practical elimination of noise from the passenger compartment by the use of three bulkheads between the passengers and the engine. The passenger compartment has three folding seats on each side and is equipped with writing and map tables. The passenger compartment is illuminated electrically with a dome light in the center, as well as lights over both map and writing tables.

Designed for Safety

The plane is a thick wing type, the wing section being an advanced development of the National Advisory Committee for Aeronautics. The section is a compromise between extreme lift and extreme speeds designed to conform with commercial requirements. The plane is strictly a transport type with safety a first consideration, comfort second and carrying capacity third. It is said to be 1200 lb. lighter than similar planes which recently have been developed for this type of work.

A hand control for the radiator shutter is fitted and the oil tank is mounted under the engine with 4 ft. of cooling pipe running through the radiator. This makes it possible to cool the oil or to heat it as necessary, or, in other words, to maintain a more uniform oil temperature.

The landing gear, a split type without axle, is designed

to enable a 12-in. deflection at the shock absorbers, which are of the rubber band type. Tires are 36 x 8-in. normal size and the tail skid is provided with a skate to facilitate landing on icy ground. The landing angle is 16 deg. and it is claimed that this angle precludes nosing over when the skid touches the ground. Wheel track is 8 ft.

As a convenience and safety feature, an electric starter and battery weighing 100 lb. have been installed.

Only corrugated duralumin is used in the plane structure. The beams and structural parts are of very stiff box section and the skin is corrugated sheet duralumin 0.014 in. thick. It is possible to walk through the entire length of the tunnel-like fuselage while the plane is in the air.

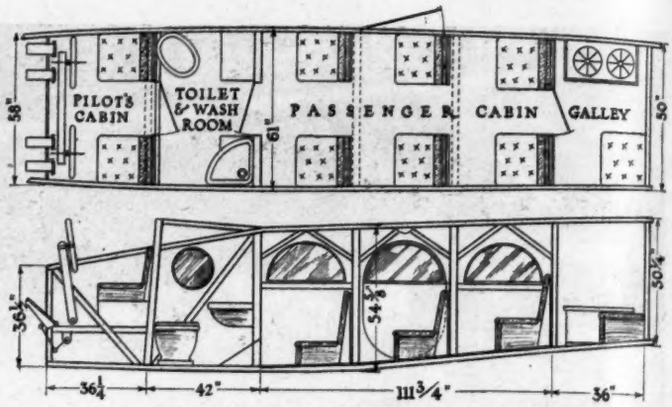
Wireless sending and receiving sets are a part of the equipment. A windshield which forms a part of the leading edge of the wing is arranged in front of the pilots. It is so made as to act as a lifting surface without increasing parasite resistance. The sides of the pilot's cabin can be left entirely open, but swing windows are arranged so that the compartment can be closed, heated and ventilated.

Supplies Convenience and Comfort

In the main cabin are six upholstered seats spaced to give plenty of leg room for the tallest of passengers. At the front of the cabin in plain sight of all passengers is an air speed meter and altimeter. The two rear pairs of seats can be folded together to form benches on the side facing each other, with card table arranged between. Meals can be served on this table from a small galley arranged at the rear of the passenger cabin.

Forward of the passenger compartment are two partitions about 3 ft. apart, inclosing a toilet and washroom and from this room one can reach overhead to a wing compartment in which baggage is carried. From this point also the gasoline tanks can be seen. Every part of the gas system up to the dashboard can be inspected or repaired while in the air. Tanks are so arranged that in filling no fuel possibly can be spilt into the wing compartments.

In its aerodynamic layout the plane resembles in some features the Fokker transcontinental plane, but is quite different in structure. The Fokker plane is of wood veneer and steel tubing with cloth covering and is said to be 1200 lb. heavier than the Stout product, which is



Plan and elevation of new Stout "Air Pullman"

all metal. This plane is also said to be 40 miles an hour faster than the Fokker transcontinental job with the same engine.

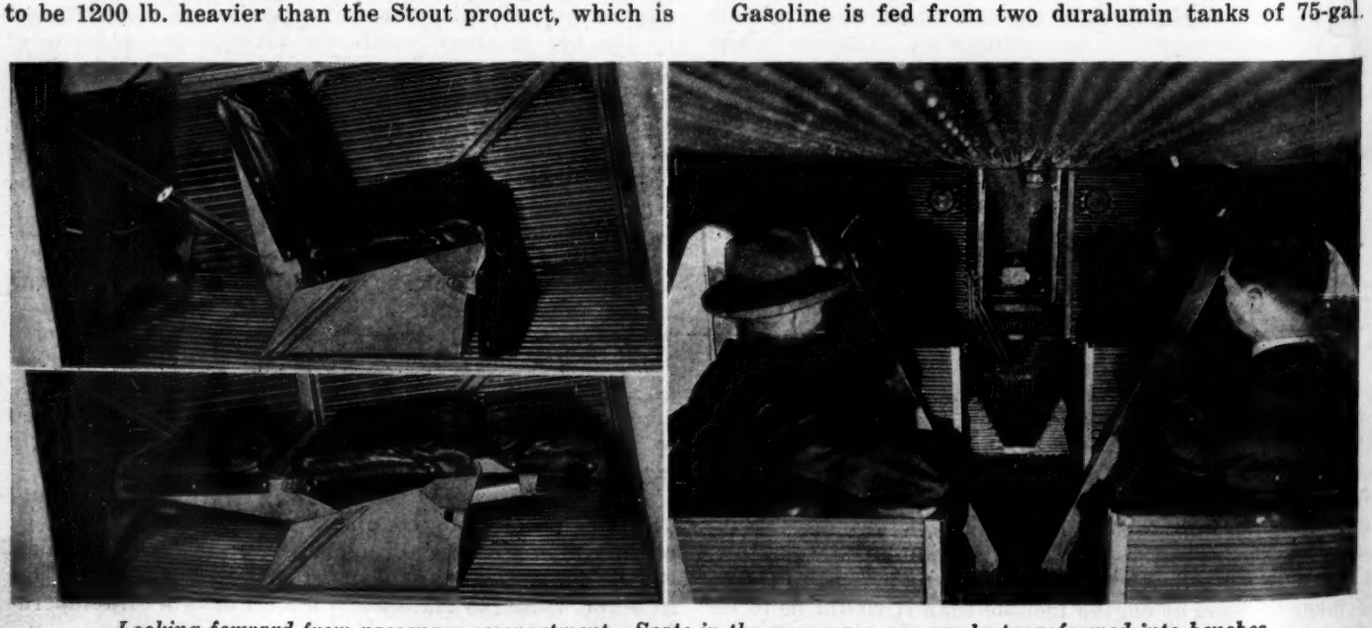
The plane is a long tail type with adjustable stabilizer and counterbalanced rudder. The wing is of tapered double convex section. The wing unit is divided into three sections, the center part of which is attached to the three main spars of the fuselage by six large bolts. The two tips are made detachable to facilitate shipping and easy transportation or for replacement in case of damage.

The wing section is such that the main spar is almost 3 ft. deep on a chord of a trifle over 12 ft. at the center. The fuselage hangs below these wings and is fitted with semi-circular windows which swing on a pivot. Pilots can see in every direction except up and to the rear. The landing gear and practically every part of the plane can be seen from the pilot seats.

Muffling of the engine is accomplished by running back along the side of the ship almost to the tail duralumin pipes drilled to permit of a gradual escape of exhaust gas. Provision for exhaust heating of the cabin is made. The cabin enclosure helps to prevent mechanical noises of the engine from annoying passengers.

A 12-volt generator provides current for ignition lights and the Bijur starter with which the plane is fitted. Starter button is placed between the pilots so that either can start the engine.

Gasoline is fed from two duralumin tanks of 75-gal.



Looking forward from passenger compartment. Seats in the passenger car can be transformed into benches or even beds

capacity each, placed 12 ft. apart and well above the engine, so that gravity feed is possible. The gasoline lines are flexibly joined, with metal connections inside the rubber hose to prevent any parts working loose. All gasoline lines in the engine unit are wound with tape and shellaced to prevent breakage due to vibration.

The plane will be made with either wheels or floats, depending on the service in which it is to be used. It is designed to carry mail or express packages as well as passengers. A spacious compartment for mail is provided. It is claimed that, with a load of 1 ton, the plane will travel approximately 5 m.p.g. of fuel. The wing load is about 9 lb. per sq. ft.

This plane is an enlarged edition of the former "air sedan" which this firm flew 3000 miles in passenger service last summer.

Novel Type of Tube Suitable for Automotive Use

AN unusual type of tubing which has come into considerable usage is being produced by the Bundy Tubing Co. As illustrated by Fig. 1, which is a cross section, the tube consists of two laps of a metal strip which is rolled over itself upon an arbor. Strip stock of a width approximately equal to two circumferences and the thickness of which is half that of the tube wall is first tinned by a continuous process in a specially designed machine which produces a bright, uniform coating.

The strip stock is handled in rolls of approximately 300 ft. length and is first passed through an acid bath and then between wiping rolls, the velocity being about 200 f.p.m. After passing through the tinning bath and heated cleaning rolls the strip passes through hot water and is rewound. Each end of the strip is punched to form an interlocking device so that the end of one strip can be attached to the beginning of the following strip to make the process continuous.

The roll of tinned strip stock then is placed at the head of another machine where it is first passed through a series of forming rolls which turn up the edges preliminary to the passage over a long bayonet type arbor which ends at a sizing die. In this operation the material is rolled over itself with one edge acting as the base. As the rolled tube leaves the end of the bayonet arbor it passes through a long heating chamber in which the adjacent walls are sweated together and thence through a resoldering chamber in which the entire surface is covered by molten solder.

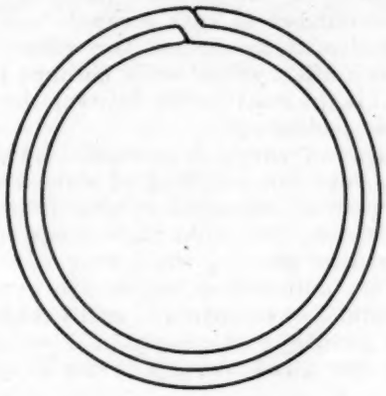
From this stage the tube passes through the final cleaning dies and out on to a receiving table at the rate of 75 f.p.m. Tube sections are cut to master lengths at the end of the tube machine and to unit lengths at the far end of the receiving table.

Stands Heat, Cold and Pressure Tests

Each of the unit lengths then is passed through a water test in which the tube is submerged in water and subjected to an internal air pressure of 15 lb. per sq. in. Following this operation, the tubes are passed over bending fixtures to produce the finished forms of the desired parts, such as gasoline lines, radiator overflow tubes, etc. In some cases, the tubes are equipped with the necessary connections before shipment. Although equipped to produce tubing in bulk, this company makes a regular practice of cutting and forming the tubular sections to the desired form and length.

At present tubes are being made in ¼, 5/16 and ⅜ in. O. D. sizes in the usual thickness range, but the process applies to any reasonable diameter and wall thickness. When finished, detection of the lap in the cross section is practically impossible, the only visible difference between this and seamless tubing being the slight line which is found at the end of the outer lap. The plant is now in production on brass and copper tubing, and steel tubing has been produced by the same methods.

Tests at the Underwriters' Laboratories show that this type of tubing is suitable for the usual automotive purposes. Bends were made by hand and with the usual fixtures and tested under 25 lb. air pressure with no indication of rupture. Although somewhat stiffer than seamless tubing, bends were made with the seam at various angles in a comparable manner. Samples were checked with commercial fittings with completely satisfactory results. Freezing tests were made by filling the sample sections with water and immersing them in a container filled with carbon dioxide snow, the resultant temperature being 15 deg. below zero Fahr. After 20 min. exposure inspection revealed no flows.



Cross-section indicates possibilities of contraction and expansion

In a pressure test, a slight rupture appeared at a pressure of 8800 lb. per sq. in., which was the maximum figure for several different types of tube under the same conditions. Tubes were filled with gasoline and subjected to the heat of a blow torch for 35 min. with no evidence of leakage, although some solder dropped off at the end of the outer lap, which was placed in the lowest position. Subsequent tests under air pressure revealed no leaks. As the tube is made commercially round, the usual service station methods for the temporary repairs to damaged gasoline lines hold good. Vibration tests of unusual nature failed to develop either fractures or leakage.

ACCORDING to Prof. Dr. Martiny, of the Technical High School of Halle, Germany, who recently conducted efficiency tests on a Stock and a Man motor plow, the small tractor has a higher mechanical efficiency than the large one, in spite of the prevailing opinion to the contrary. Plowing to a depth of 8 in., the two plows, both of a rating of 25 hp., completed 1.32 and 1.43 acres per hour, respectively, and the fuel consumption was at the rate of 2.21 and 2.41 gal. per acre, respectively.

What Factors Will Determine Sales Volume in the Future?

Style, average life of car, relation of registration curve to bank clearings and the number of vehicles scrapped are basic elements in projecting sales.

By Harry Tipper

WHAT is the future market going to be? This is one of the questions which executives today are trying to answer. Sales have not reached a saturation point, but they have reached a place at which new and fundamental elements have entered in estimating purchases in the automotive field for years to come.

Style is rapidly becoming an important factor in buying, particularly in the medium and high priced car classes. The number of cars scrapped each year, and the average life of a car are two other self-evident elements which affect sales, while perhaps the most important of all is the relationship between the registration curve and bank clearings.

The registration curve is a stable foundation from which to consider the weighing of market changes, because it represents a practical accumulation of the number of cars in use. The wide fluctuations which appear in the production growth, while they show the sensitiveness of the automotive business to general market conditions, cannot be compared so easily with other bases of economic growth, particularly in developing a probable market over a considerable period of time.

Basis for Determining Purchasing Power

General estimates of purchasing power may be developed on the basis of bank debits to individual accounts or bank clearings. Bank debits is the better basis, but the figures cannot be secured so readily over a period of years. Bank clearings have been compared in the chart shown in this article with registration. Both the curve of bank clearings and registration growth are cumulative, so they may properly be compared.

This comparison shows that purchasing power went ahead much more rapidly than the registration of autobiles from 1918 to 1922, but this slack was taken up in 1923. The constant development of registrations in accordance with purchasing power is illustrated by the parallel growth of these curves over a series of ten years. The high point of registration in comparison with bank clearings was reached in 1916 and 1917, extending almost to 1918. From that point the bank clearings showed a larger growth than the registrations until 1923, when the registrations regained the same ratio to bank clearings as they held in 1917.

This examination indicates that further illumination of the market from the standpoint of use can be secured by the extension of these comparisons beyond the accumulation of cars and of purchasing power throughout the country at large. For instance, a comparison between debits to individual accounts, bank clearings and registrations, and an application of these three items to the changing percentage of individual income might provide an economic background in considering the future market for the automobile, which has been lacking in the analytical examinations up to the present.

Two Tendencies Affect Automobile Use

Registrations as cumulative evidence of the tendency in automobile use are affected, however, very vitally by two elements which must be definitely weighed as to their value. These elements are the life of the car as a practical medium of transportation, and the effect of the style element in changing the practical life. The numbers of cars required to replace those going into the scrap heap because they are no longer useful represents the minimum market for new automobiles for any particular year. General economic conditions may delay the scrapping of a certain number of these automobiles, so that in some years the minimum market would be somewhat less and in some other years somewhat larger than the economic scrap.

Because the life of the car is changing, that is to say, its mileage usefulness increasing somewhat, the calculations on this point would have to be weighed in measuring their value in quantity as an estimate of the future minimum market.

The actual cars going into the scrap heap, however, or being eliminated from registration, are affected by the style element, which not only reduces the value of previous cars, but increases the amount of new buying because of the social effect of the style. The value of the style element is increasing and is bound to increase further.

Style enters into the buying of all important accessories of social life, and the automobile as an individual unit of transportation is affected by the same requirements. The extent to which style is used as an inducement to buying is under the control of the manufacturer to a large degree and should be carefully studied in order that its use may provide the proper incentive beyond the economic requirements of replacement.

Fashion Becomes Increasingly Important

It is obvious that the new car owners, those who have not owned a car previously, will represent a smaller and smaller percentage of the total market as the business gets older. In many States it will not be long before the growth of registration parallels the curve of population growth, so that new buying will be confined to the natural increment of population. Consequently the market for automobiles will be more and more closely related to the economic requirement of replacement plus the impetus of the style element introduced by the manufacturer in his mechanical and general improvements.

The increment in the life of the car due to the improved machinery will be less and less each year, whereas the reduction in the life of the car due to the style element will increase somewhat each year. This means that mechanical improvements must be considered more and more from their value as style elements and less from their value as economic requirements.

Limiting Conditions Influence Buying

While there are no actual limits to the market for automobiles domestically in the United States, there are limiting conditions which indicate a slower rate of progress in percentage and a larger degree of sensitiveness to immediate outside, psychological conditions. The study of replacement will not be at all complete if the market investigator in the automotive field fails to take into consideration the fact that the individual purchaser does not dispose of his present car and buy a new one from purely economic reasons.

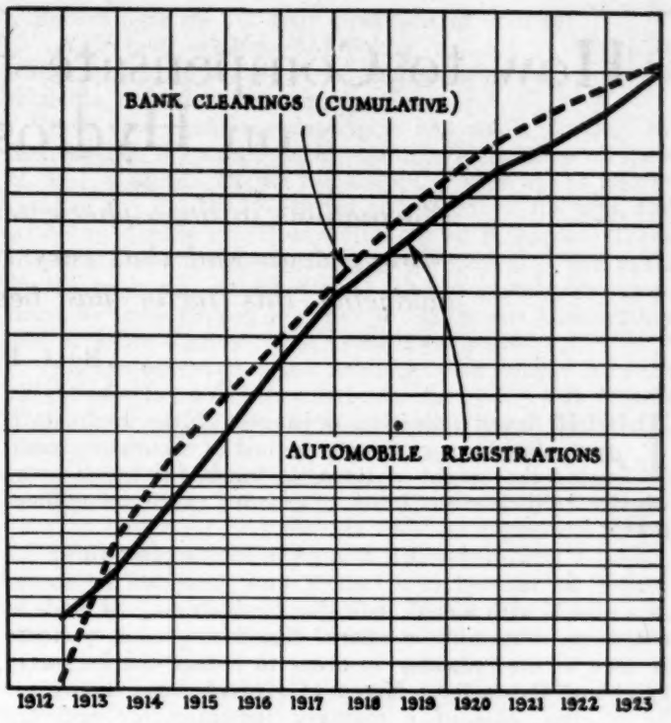
The average individual works upon his cash position mainly. He is ready to pledge himself to pay a certain amount of money regularly in the future, so long as it does not too seriously embarrass his checking account at any time. Similarly he will repair his old machine, even though it is not intrinsically worth repairing to that extent, when he is feeling poor, and he will buy a new machine, even though there is a lot of value in the old machine, when he is feeling comfortable from a cash standpoint.

One of the unknown factors affecting this entire proposition of replacement is the average length of ownership of the individual car. The importance of the used car market indicates the widespread tendency to sell cars before their usefulness is ended, and it is quite likely that the average car goes through a number of transactions before it reaches the scrap heap. There are no figures with which to determine the tendency in one direction or another in connection with the life of a car in the hands of an individual owner. Information on this point is of great importance and it should be possible to assemble some of it through the operations of the acceptance companies and other bodies whose business requires them to be familiar with such changes.

Leaving out of consideration the number of times a particular car is bought and sold, the market for automobiles tends to become more and more a question of replacement, style element and general purchasing power.

Market Investigators Search for Facts

It is evident from the discussions which are constantly taking place that the market investigators are only developing at the present time some of the information which is necessary to a thorough study of this proposition. There is a tendency to forget that the automobile is a social machine and is subject to the more rapid fluctuations of such buying. There is a tendency to discard the economic limitations of purchasing power, which naturally have a very great bearing upon the future of the automobile business, and there has been no sufficient examination of the actual replacement requirements, the variation in scrapping, the increasing value of style, and the changing possession of the used car. As a consequence the future speculation of the market position is confined to a few months at most, and there is no time for the establishment of a policy which will be based upon a minimum estimate of four or five years. For the sales manager the present market is of supreme importance, but the general executives of a manufacturing company are concerned with extension developments,



Ratio between automobile registration and bank clearings (cumulative)

investments, and policies which cannot be established upon a market knowledge of a few months.

Nothing has been said in this article as to the place of export business in the future of the automobile manufacturer in the United States, but it is obvious that export must be considered increasingly important by those companies who desire a thorough stability of their business, because the United States has no competitor in quantity production of reliable vehicles at a reasonable price and is not likely to have any serious competition in the near future.

Foreign Markets Have Stabilizing Effects

Many of the foreign markets are relatively unsaturated and represent large potential developments for the absorption of automobiles. Their requirements must be based on longer studies and policies which are developed much further ahead, so that export activity will have a tendency to stabilize an entire organization and to render it less sensitive to the immediate and rapid fluctuations of domestic buying. This subject represents a study which can be conducted at the same time that the domestic analysis is being considered.

These factors, as affecting the future market of the automobile, may be summarized in the following way: The accumulation in registrations closely parallels the growth in general wealth or purchasing power, so that a study of the purchasing power itself will suggest the immediate future in regard to additional cars. The life of the car becomes increasingly important as the percentage of new buyers decreases.

Style is becoming increasingly important, and consequently can be used to stabilize the market to some extent by the additional stimulus it gives to buying. It is along the line of women's fashions and materials that research will probably pay largest profits. The information at present available on these matters is not sufficient to do more than illuminate the problem. The factors must be taken into consideration, however, in the more accurately developed market analysis which necessarily lies before the automotive manufacturer.

How to Compensate for Temperature Effects on Hydrostatic Gages

Fluctuations in atmospheric temperature change volume of the entrapped air and thus vary readings. A practical method of balancing this factor has been worked out in great detail.

By J. P. Nikonow

LIQUID level indicators or gages of the hydrostatic type afford a very simple method of accurately measuring the height of liquid in tanks, the gages being usually calibrated in units of volume, such as gallons, liters, etc.

Fig. 1 represents such a gage in its simplest form. A tube *F* is inserted in a tank *T* and connected by means of a pipe *V* with a dash indicator *I*, which may be made as a U-tube, containing a colored liquid *o*. A heavy liquid is used in the indicator in order to reduce the necessary height of the latter. Mercury is rarely used, being too heavy, the scale of a mercury indicator for ordinary automobile tanks, for instance, being only about ½ in. high. Acetylene tetrabromide is most extensively used, being dissolved in oil and colored with a red dye. It has certain disadvantages, however, as it evaporates (it has a rather strong odor) and absorbs gasoline vapors, like every other oil solution. The gasoline absorption appears to be greater than the evaporation, as the solution in time becomes lighter.

Under ordinary hydrostatic pressures from the liquid in the tank the compression of the air in pipe *V* is very slight, especially if the pipes used are of small diameter (about ⅛ in. outside and 0.08 in. inside), but the temperature effect on the air in the pipe is so great that the gage is absolutely useless unless this effect is eliminated or compensated. It is easy to see that the pressure of the liquid in the tank will force some of the liquid into the lower end of the pipe *F*, so that the gage will measure only the difference in the heights of the liquid in the tank and in the tube (the height *H'*). Now, owing to temperature variations, this height *H'* will be constantly changing. Therefore, the only way to make the gage independent of temperature variations is to keep liquid out of the pipe *F* at all times and calibrate the gage to register the net height of the liquid in tank *H*. This can be accomplished by adding an air valve *y* and pumping air into pipe *V* through this valve every time a reading is taken (or only if the temperature or level has changed).

Filling Tube with Air

The air can be forced in by means of a little hand pump, usually placed on the gage, or by connecting the valve with the engine exhaust. The latter method has not proved practical, however, and is not used at present, chiefly on account of difficulty in maintaining the valve clean but also on account of the impossibility of getting enough pressure for deep tanks at low engine speeds.

Another method of temperature compensation is shown in Fig. 2. Here a liquid column of a constant height is maintained in the pipe *F* by means of suction from the vacuum tank through the valve *y*. The gage in this case registers the height of the column *H*, which represents a difference in the heights of the liquid in the pipe *F* and in the tank.

One disadvantage of this arrangement is that the liquid in the gage may become ejected through the open end of the U-tube, if the engine suction is applied to the valve when the tank is empty, so that air is drawn from the bottom of pipe *F;* or if the liquid is shaken out of this pipe or evaporated when the car is shipped with an empty tank.

The vacuum suction when applied to the valve *y* may bring the gage to zero reading for a moment, unless some provision is made to compensate its effect on the U-tube.

Instead of the U-tube a diaphragm gage or indicator is sometimes used, although a diaphragm possesses certain disadvantages; it has a certain amount of internal friction which reduces the accuracy of the instrument; the accuracy is further reduced by the friction and lost motion in the transmitting gears and links. Besides, unless the diaphragm is properly aged, its elasticity changes with use.

This arrangement cannot be used on tanks under air or gas pressure.

The artificial compensating liquid column in pipe *F* can be also maintained by a system of funnels, collecting splashes of liquid above the valve *y* until the weight of this liquid opens the valve and replenishes the column in pipe *F*. Of course, the valve and the funnels are placed inside of the tank. Splashes of liquid and its movements have been utilized also to operate a small air pump for the valve *y*, Fig. 1.

Automatic Compensation

Fig. 3 illustrates an arrangement in which the temperature compensation is accomplished automatically without any mechanical devices. The principle of this arrangement is that air pipes *V* and *V'* extend from both legs of the U-tube of the indicator *I* to the tank and terminate in traps containing movable liquid columns. The sizes of pipes, their volumes and the specific gravities of the liquids contained are so proportioned that for any change in pressure in pipes *V* and *V'*, whether caused by temperature variations or by barometric changes, the change of height or hydrostatic pressure in one trap always equals the corresponding change of hydrostatic pressure in the other trap. These pressures being transmitted through the air pipes to the opposite legs of the indicator U-tube, it follows that the indicating level does not become displaced one way or the other.

This compensation is effective only when pressure changes at the same time and to the same extent in both air pipes. If the pressure is changed in one pipe only, then, of course, the indicating level will rise or fall. So, if the pressure on the first trap is changed by reason of a change in fuel level in the tank, then the indicating level becomes displaced, which in turn displaces the liquid column in the other trap.

The tube *F* (the "receiving" tube) is provided at its lower end with the first trap, which consists of an open

cup containing a comparatively heavy liquid which does not evaporate and does not mix with the liquid in the tank. Glycerine may be used if the tank contains gasoline, or a solution of 85 per cent glycerine and 15 per cent water. This solution does not evaporate, is not affected by gasoline and does not freeze until about 30 or 35 deg. below zero is reached. This receiving tube is connected with the air pipe V and the rear tube Q of the indicator. The latter may contain colored oil or also a colored glycerine solution. The other leg of the indicating U-tube Q is connected with the return air pipe V' and a compensating or balancing trap in the tank, consisting of a U-tube which is open on the other end and contains oil or glycerine.

It is evident that the tube F must contain a column of liquid even when the tank is empty; therefore, the gage is "set" or connected together when the tank contains a certain amount of gasoline, for instance, one-half to one-third of its capacity. Accordingly the indicator before being connected has enough liquid introduced in it to indicate this amount. The condition at the time of making connections is shown in Fig. 3. The pressure of gasoline forces the liquid in the tube F to a height H', while the liquids in the indicator and in the balancing U-tube remain level.

If the tank is now filled by adding a height H'', then the liquid in tube F rises through a height H. The indicating liquid recedes in the rear tube Q by the height m and rises in the front tube q by the height M. The balancing liquid recedes in the closed tube f by a height L and rises in the open tube f' by the height K.

It is possible to assign such dimensions to all pipes and tubes so that the gage will be perfectly compensated for all temperature and pressure variations.

We denote by q, Q, F, f and f' the cross-sectional areas of the respective tubes. Let V and V' be the air volumes in the pipes, including the air in the U-tube and traps. Let g be the specific gravity of the liquid in tank and o, p and p' the specific gravities of the liquids in the indicator and traps.

We then have the following equation for hydrostatic balance of the liquids for a full tank:

$$(L+K)\,p' + (M+m)\,o + HP = H''g \quad \ldots\ldots\ (1)$$

The volumetric displacements in all the tubes should be equal, provided we take into consideration coefficients of air compression a for the volume V and b for the volume V'. These coefficients do not exceed 1 to 2 per cent for ordinary tanks and could even be neglected.

Accordingly we get four equations of volume:

$$HF = amQ = aMq = bLf = bKf' \quad \ldots\ldots\ (2\text{-}3\text{-}4\text{-}5)$$

where $a = I\alpha$ and $b = I\beta$, α and β being the above coefficients.

These five equations determine the scale, so that by distributing the weight of the column H'' in three columns H, $M+m$ and $L+K$, we can make the scale of the instrument of any desired length for any height of the tank and with any specific gravities of the liquids employed. These conditions are satisfied with any diameters of the tubes in the gage and in the traps. The diameters, however, must be proportioned in order to obtain the temperature and pressure compensation as outlined above.

This compensation is accomplished if a change h in the height of column H is equal to the change $l+k$ in column $L+K$, considering also the specific gravities of the liquids. Thus we get

$$(l+k)\,p' = hp \quad \ldots\ldots\ (6)$$

The changes in volumes V and V' caused by the expansion or contraction of the air may be expressed by the following equations:

$$a'TV = hF \quad \ldots\ldots\ (7)$$

$$a'TV' = lf \quad \ldots\ldots\ (8)$$

where a' is a temperature coefficient for gases and T the temperature.

Dividing equation (7) by equation (8) we get:

$$V/V' = hF/lf = C \quad \ldots\ldots\ (9)$$

where C denotes the ratio of the volumes V and V'. This ratio may be more or less than unity, but it is best to have the volumes equal, because then the connecting pipes may be changed in length without affecting the temperature compensation. This condition may be expressed by the derived equation:

$$C = (l+k)\,pF/lp'f \quad \ldots\ldots\ (10)$$

This equation determines the ratio of the tube diameters for a given ratio of the specific gravities p and p', considering also that

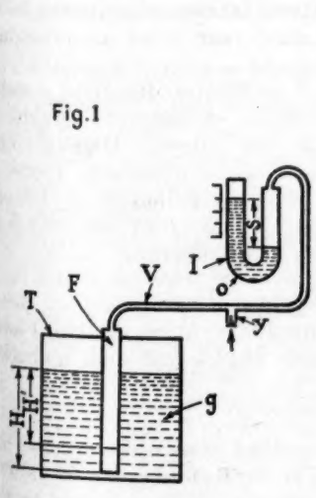
$$(l+k)\,l = I + f/f' \quad \ldots\ldots\ (11)$$

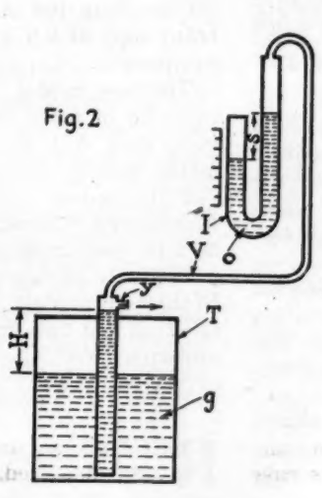
If the proper sizes are selected for the tubes in the tank and the rear gage tube Q is known, then for each height of tank the section of the glass tube may be determined by solving equations (1) to (8) inclusive for Mq and dividing the latter by M:

$$Mq = \frac{bQF\,(H'' - MO/g)}{aQ\,(Cp'/p + bp'/g) + bFO/g} \quad \ldots\ldots\ (12)$$

The coefficients a and b are very close to unity and may be disregarded.

In practice the correct volume adjustment can be made





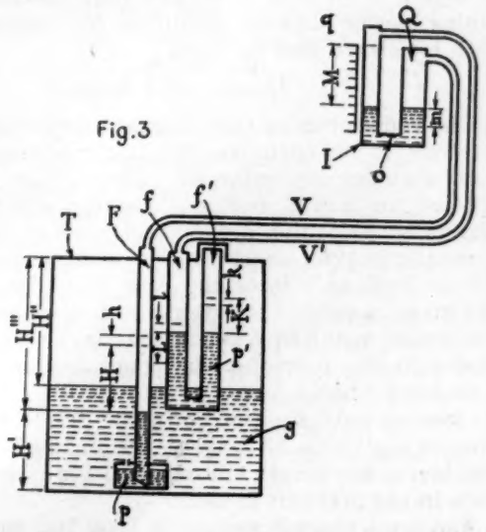


Fig. 1—Keeping gage tube full of air by means of pump. Fig. 2—Drawing tube full of fuel by inlet vacuum. Fig. 3—Compensating air line and U-tube

by adjusting the amount of liquid in the balancing U-tube. For instance, if with rise in temperature the gage level drops, then it shows that the volume V' is too large, as its effect is stronger than the effect of the volume V, and the amount of liquid in the balancing tube should be increased.

For installation purposes it is possible to have the bottom cup in the tank sealed with the liquid column H' already raised, the seal being opened after the installation has been completed.

With this construction it is necessary to have all of the gage parts thoroughly tested, as any leakage is bound to cause errors in the gage readings.

For tanks under heavy pressure (over 5 lb. per sq. in.) and for boilers, the pipes may contain some light liquid instead of air.

Instead of the indicating U-tube, a mechanical indicator with a diaphragm may be used. This diaphragm should not be resilient and must be very soft, as it must simply transmit pressure from the gasoline in the tank to columns H and $L + K$.

The cup at the bottom of tube F may be dispensed with for liquids which do not form vapors, as for instance lubricating oil.

Garford Announces New 2½ Ton Truck, Model 50

A NEW 2½-ton truck model is now in production by the Garford Motor Truck Co. It is to be known as Model 50 and replaces the former Model 70H, which has been discontinued. While most of the general specifications, such as bore, stroke, wheelbase and tire size remain the same as in the previous model, there have been a number of changes in design in various parts of the vehicle.

The 4½ x 5½-in. engine has a counterbalanced crankshaft.

A double gearset is one of the features. One of the gearsets is a unit with the engine and clutch and the other is supported amidship on two special cross members of the frame. The propeller shaft is divided and has four universal joints, one behind the first gearset, one on each side of the amidship gearset and one at the rear axle. The two forward universals are of the fabric type with three disks, while the two rear universals are of the metal type.

The double gearset provides eight speeds forward, one of which is an over drive and four speeds reverse, providing power take-off facilities for operating winches both backward and forward.

Details of Changes

The radiator is of the cartridge core cellular type. It is mounted on cushions and the radiating surface has been considerably enlarged. The springs have been increased in width and are heavier all through. The spring shackle pins are made larger to fit in with the generally heavier design of the springs and frame.

The front axle is of the drop bed type. This design has made possible the lowering of the frame 3 in. Hollow spoke metal wheels are standard equipment on the Model 50, the previous equipment having been artillery type wood wheels.

Changes have been made in the driver's seat to afford greater comfort and convenience in handling. The control levers are longer and the position is more accessible than in the previous model.

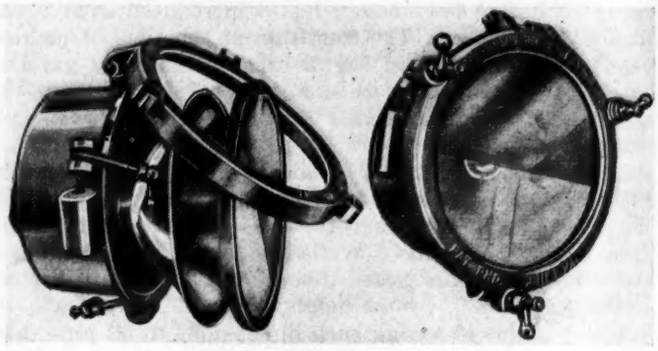
The total chassis weight is 5900 lb., which is 600 lb. heavier than on the Model 70H.

Model 725, a 1½-ton job, has been discontinued and a new model will shortly be in production to take its place. Details of this new model are not yet available.

Headlamp Suitable for Trucks

A HEADLAMP suited especially for use on trucks has been placed on the market by the H. Parkin Magneto Service Co. of 325 North Fifteenth Street, Philadelphia. These lamps are cast from aluminum alloy and all fittings are of bronze. The door is hinged at the top and is held in place by unbalanced wing nuts on swing studs, the arrangement being such as to prevent loosening of the nuts by vibration or the loss of nuts, since the latter cannot be taken off the studs.

To prevent rattle and maintain a tight joint the lens is set in channel rubber and is clamped securely between the door and the reflector.



A substantial headlamp for trucks made by H. Parkin Magneto Service Co.

Bethlehem Announces New Truck Models

BETHLEHEM MOTORS CORPORATION at Allentown, Pa., has recently announced the addition of two new models to their line and the dropping of one model.

The new model "L," a 2½ to 3-ton job, supersedes the model "HN," which has been discontinued. This new model "L" has a rated capacity of from 5000 to 6000 lb. exclusive of body allowance and will be known as the "Sturdy." This model will be furnished in a standard wheelbase length of 145 in. and special lengths of short 120 in., long 168 in. Four-speed transmission, solid 36 x 4 front and 36 x 8 or 36 x 4 dual rear tires are standard equipment.

The new model "M" is a 3 to 3½-ton job with a rated capacity of from 6000 to 7000 lb. exclusive of weight of body and will be known as the "Heavy Duty." This model will be furnished in a standard wheelbase length of 162 in. and a special long wheelbase length of 180 in. Four-speed transmission, solid 36 x 5 front and 36 x 5 or 36 x 10 rear tires are standard equipment.

The new models embrace the same features found in all Bethlehem models: magazine chassis oiling system, Bosch ignition and two unit starting and lighting system, Pierce governor, Bethlehem own make engine and dual reduction drive.

RECENT statistics show that Switzerland now has 22,655 automobiles. The largest number of cars is owned in the Canton of Zurich, viz., 3728, followed by the Canton of Geneva with 3424. Switzerland now has one automobile to every 175 inhabitants.

Here and There in Foreign Markets

(Courtesy Automotive Division, Bureau of Foreign and Domestic Commerce.)

Numerous Automotive Shows in Europe

AN international exposition of automobiles, airplanes, motor boats and sporting goods, organized by the Automobile Club of Portugal and the Syndicated Chamber of Automobiles and under the patronage and honorary presidency of the President of the Republic, will be held in the exposition hall of the Crystal Palace in Oporto, from May 23 to June 7, 1924, inclusive.

An international Exhibition for Commerce and Industry will be held at Tilburg, Netherlands, from July 18 to Aug. 18, 1924. A section of the exhibition will be devoted to motor cars, motorcycles, bicycles and accessories, and another to airplanes, motors, accessories and aeronautical instruments.

Frankfort-on-the-Main, instead of Leipzig, is to be the scene of the first post-war international automobile show in Germany. The change is made because of more suitable exhibition space being found in Frankfort, and because of this city's location near the Rhineland, now the center of world-wide interest.

Gas Pumps Sell Well in Australia

THE number of gas-filling stations existing in Australia is limited, the development of this service not having occurred on the same elaborate lines as in the United States. Filling stations usually are found in connection with the general garage and circularization among the garages would constitute the principal means of promotion to be followed by a pump manufacturer desiring to enter the market.

At present, four types of gasoline measuring pumps are being manufactured in Australia, but the product of a leading American concern is receiving the largest portion of the business here, according to Assistant Trade Commissioner Elmer G. Pauly, Melbourne. All the locally-made pumps sell at approximately £250, while the price of the American pump is £280.

Holland Wants a Model Motorbus

THE rapid development of bus service in the Netherlands is one of the most interesting occurrences in European automotive history, says Frank W. Machin, American Consul at Amsterdam. On Oct. 19, 1922, the municipality of Amsterdam started a bus line from a central point in the city to a suburb four miles away, using 11 machines with a capacity of 21 seated and 5 standing passengers. Today there are more than 1800 buses in use in the country, operated by 600 different companies and individuals; but officers of the Association of Autobus Operators have declared that the vehicle which is proper and desirable for Holland has not yet appeared on the Dutch market.

It is suggested that a medium-powered car providing space for 16 to 30 passengers, with left-hand drive, might meet this demand. Here lies the opportunity for American manufacturers. Samples of American cars should be put in operation in Holland as soon as possible, before the Government begins an expected examination of the various machines in use.

In entering the Dutch market American manufacturers must compete against European makers who have the advantage of low rates of exchange and who extend liberal credit terms on their cars. An important point in any sales campaign would be the availability of a sufficient stock of accessories.

Aside from the expansion which bus service will doubtless see, a considerable market already exists through the need of replacements. The life of the average bus is estimated at three years, and since the number of machines in operation is estimated at 1800, an average of about 600 new vehicles would be required yearly to maintain that number in operation.

The best method of entering the Dutch market doubtless will be through the Association of Autobus Operators. Its president is Mr. H. M. P. Van Emmerik, 78 Frans Halsstraat, Hilversum, and its secretary and treasurer is Mr. A. de Jong, Soestdijksche Straatweg 10, Hilversum.

Chile to Have Railway Auto Ambulances

THE Chilean Government is accepting bids for a railway auto ambulance to be constructed along lines of the usual public ambulance and to be operated on a one-meter gage railroad.

The motor must be able to work without difficulty on continuous upgrades of 6 per cent and must be able to travel from sea level to an altitude of 4500 meters.

The ambulance will be used on the Arica-La Paz Railway, through a desert region in which there are no highways. Bids were specifically requested from several Santiago firms, Consul Egmont C. Von Tresckow, Arica, Chile, reports.

Bus Lines Extending in Shantung

EXPANSION of the auto bus service in Southern Shantung, China, is well under way. One of the two lines now in operation between Tsining and Ts'aochou is controlled by military authorities, who are reported to be planning to purchase a considerable number of additional machines. A regular daily schedule is maintained, the rate charged being $30 per car per day and $5 per passenger between the two cities. Recently a commercial company also has been organized between the same cities with three machines now operating and others to be purchased, says Consul R. P. Tenney, in a report from Tsinan.

New Valentine Varnish System Said to Double Life of Finish

Only six coats required on best grade work if bare metal is sufficiently smooth. Durability attributed to high and balanced elasticity and use of two clear final coats giving film of unusual thickness. Cadillac, Lincoln and Packard among users.

COMPARATIVELY recent but growing demands for more durable automobile finishes have resulted in two lines of development: that of producing what are comparatively new materials for this purpose, and that of improving methods and material already widely used.

An important development in the latter class, which, it is understood, is being employed in the production of Cadillac, Lincoln, Packard and some other cars in the higher price class, has been announced recently by Valentine & Co. under the name of Valentine's Super-System of Automobile Finishing.

This finish is claimed to be about twice as durable as the best varnish finish heretofore produced and to give about four times the life of the average varnish finish. The system differs from those used heretofore chiefly in three important particulars: First, in the more careful preparation of the metal than commonly has been regarded as necessary; second, in the elimination of all unnecessary paint and varnish undercoats; and third, on the superimposing of a second coat of finishing varnish on a first coat of finishing varnish of suitable character.

Only six coats are required on metal smooth enough to permit of dispensing with surfacing coats. These consist of one metal primer, one of elastic ground color, one of rubbing color varnish, one consisting of a mixture of rubbing varnish and first coat finishing varnish in equal parts, one of first coat finishing varnish, and one of final finishing varnish.

Takes from Seven to Nine Days

These six coats can be applied in conjunction with the usual forced drying equipment in from seven to nine days' time, exclusive of the time in which the car is in the trim shop. Trimming is done after the first coat of finishing varnish is dried and before the final coat of finishing varnish is applied. If the metal is not sufficiently smooth to give the desired finish without additional surfacing costs, these can be employed, but the total time for producing the very high grade finish which results from this process need never exceed two weeks, even with the extra surfacing coats, providing the usual forced drying facilities are employed.

Since durability of varnish finishes is dependent in large part upon the elasticity of the various coats, a special point has been made of producing a product

Schedule to Be Followed in Application of Valentine's "Super-System"

Material	Method of Application	Time and Temperature Force Dry Schedule
1. Celox primer	Spray or brush	6 hours at 125° F.
2. Elastic ground color[1]	Spray or brush	2 hours at 125° F.
3. Elastic ground color[1] if needed	Spray or brush	2 hours at 125° F.
4. Color varnish in 48-hour rubbing varnish[2]	Spray or brush	12 hours at 125° F. water sand
5. Color varnish in one-half 48-hour rubbing varnish, one-half first coat finishing	Spray or brush	First air dry overnight at 75° F., then force dry 24 hours at 125° F. Pumice rub.
6. First finishing varnish applied like finishing varnish in finishing room[3]	Brush	First air dry 24 hours at 75° F., then force dry 24 hours at 125° F. Pumice and rottenstone polish-rub.
7. Final finishing varnish[4]	Brush	First air dry 24 hours at 75° F., then force dry 24 hours at 125° F.

[1] Superfine Japan Color thinned with a mixture of 20 per cent 48-hour Rubbing and 80 per cent pure spirits of turpentine.
[2] Quick Leveling or Motor Rubbing.
[3] The *first finishing* used is Motor Chassis Finishing, a varnish with 90 point elasticity.
[4] The *final finishing* used is either Double Body Wearing Body, elasticity 100, V. A. V. Finishing, elasticity 180, Motor Finishing, elasticity 135, or on hoods, wings, and wheels H. B. Motor Chassis Finishing, elasticity 125.

with a minimum of brittle material. It will be noted that only one coat of straight rubbing color varnish is used and this is a true 48-hr. rubbing varnish. The next coat, it is stated, has an elasticity of 30 to 40 points, Kauri reduction test, which is said to be equivalent in durability to the final coat of finishing varnish used on many cars, while succeeding coats have 90 points and from 100 to 180 respectively.

Special emphasis is laid on the fact that there is a coat of clear finishing varnish between the final finishing coat and the last coat containing color, which, it is asserted, adds greatly to the life of the job, especially over blues, which ordinarily have an unfavorable action upon varnish coats with which they are in contact.

As with other Valentine automobile finishes, care is used to secure what is termed "balanced elasticity" of coating, that is, a combination of coats such that there is a proper gradation in the elasticity, beginning with an elastic primer, following this with less elastic coats, and then again increasing the elasticity gradually from coat to coat and finishing with a coat having an exceptionally high elasticity.

The relative elasticity of the various coats employed in the Super system and two conventional systems is well illustrated by the curves given in the accompanying cut. The curve marked "standard system" is said to correspond to the average high-grade finish employed in production work, while the ordinary system is understood to apply to the cheaper varnish finishes which are employed on some cars in the lower price classes. The greater durability of the Super system is attributed largely to the comparatively small steps or gradations in elasticity.

The principles upon which this system is based are said to involve nothing new or untried, but simply the latest developments along lines which have governed similar systems in the past. Increased durability is attributed partly to the use of two coats of finishing varnish, the first having what is said to be double the elasticity of the finishing varnish used in most automobile work, and the second running up to 100 per cent greater elasticity than, it is claimed, has been used heretofore in the best standard practice.

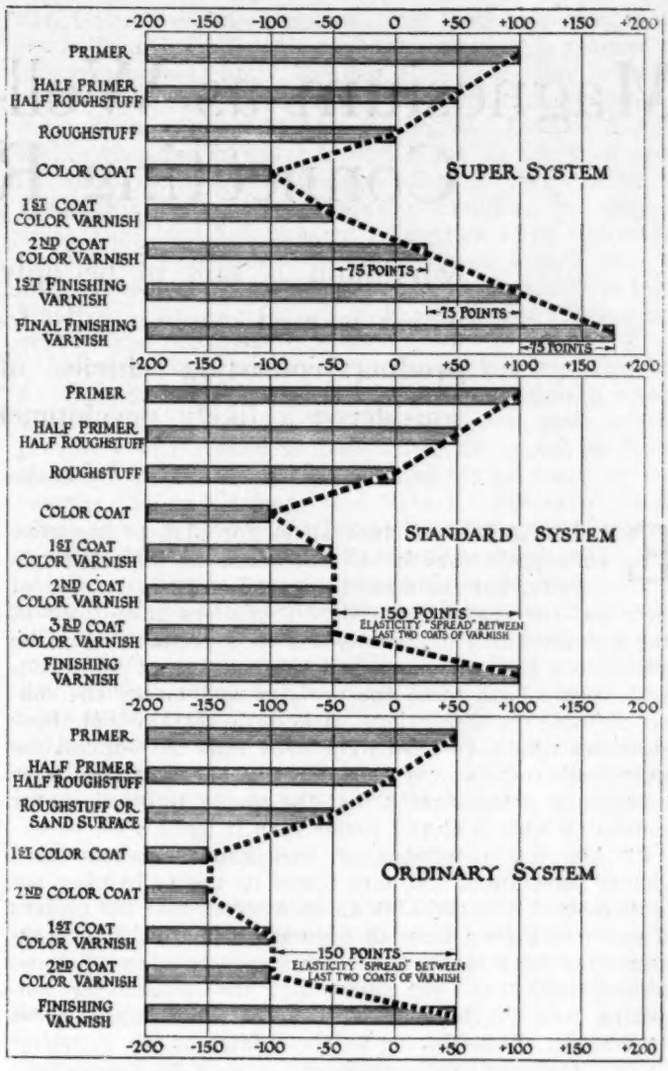
Another factor affecting durability is the thickness of film formed by the finising varnish, which is dependent largely upon the body or viscosity of the varnish employed. The finishing varnishes used in the new system run, it is stated, from 2 to 3.20 poises, absolute viscosity, while it is claimed that the varnishes generally employed for the same purpose range from 0.80 to 1.40 poises.

Total Film Thickness High

The two coats of finishing varnish used in the new system are said to give a total film thickness of averaging three times that ordinarily secured. This, together with the minimum number of surfacer coats, the balanced elasticity of succeeding coats and the high elasticity of the finish coats, are held to account for the exceptional durability claimed.

It is stated further that cars finished by this system can be refinished a number of times without difficulty due to undercoat checking, such as is apt to happen after the usual paint structure is revarnished once or twice.

A somewhat detailed schedule of operations, times, temperatures, etc., covering the Valentine Super-System is given herewith in tabular form. This schedule is intended for metal bodies and hoods in which the metal conditions are such as to render surfacing coats unnecessary. If the finish is to be used where the condition of the metal is such as to require a minimum surfacer to fill file marks, scratches and small dents, the tabular schedule is preceded by the application on one coat of



Charts based on data furnished by L. V. Pulsifer showing difference in elasticity between various varnish finishes. It is desirable to have high elasticity but minimum difference between coats

Celox primer sprayed or brushed on, dried 6 hr. at 125 deg. Fahr., and one coat of sanding surfacer, sprayed or brushed on and spot puttied as soon as surfacer has set. This coat is dried 3 hr. at 125 deg. Fahr. and all surfacer is sandpapered off except that left in scratches and indentations. This operation is followed by a second coat of Celox primer applied and dried in the same manner as the first coat of primer.

If metal conditions are such as to make the use of roughstuff absolutely necessary, the schedule in the table is preceded by the following operations: 1—One coat Celox primer, spray or brush and dry 6 hr. at 125 deg. Fahr.; 2—One coat consisting of half Celox primer and half roughstuff, sprayed or brushed on and dried 6 hr. at same temperature; 3—Spot putty, applied by knife and dried 3 hr. at 125 deg. Fahr.; 4—One coat roughstuff, sprayed or brushed on and dried 6 hr. at 125 deg. Fahr.; 5—Same as 4. 6—After rubbing down the roughstuff and allowing the moisture time to dry out, a coat of Celox sealer is sprayed on. This is wiped off dry with rags and then is baked 12 hr. at 125 deg. Fahr. After this the schedule in the table applies, beginning with the elastic ground color.

It should be understood that all of the materials mentioned in the table are Valentine products, marketed under the names indicated.

Magnesium as Well as More Aluminum Connecting Rods Predicted

Duralumin is said to be only alloy containing these metals which is used commercially for this purpose, but still lighter product consisting chiefly of first mentioned element is considered a likely development. Strength-weight ratio high.

By Leslie Aitchison*

EMPLOYMENT of light alloys for pistons has gone sufficiently far to be considered to have lost its novelty, but the same thing can scarcely be said of their use for connecting rods. Engineers have jibed at this practice for a long time, and it is probably only the action of a few who have had the courage of their convictions and have faced the problem that makes the subject suitable for discussion. It is quite certain that those engineers who have tried light alloy rods have found the experiment to be a very remunerative one, and they have incidentally demonstrated that the use of light alloys for connecting rods is almost easier than it looks.

In America a number of well known makers have adopted duralumin, and have found its use to be most advantageous. It is probably an open secret that the makers of one well known English light car which sells in large quantities have taken the same step. In view of these developments, the light alloys that are suitable for connecting rods will be dealt with in the same way as those for pistons. Before doing so, the opinion of Mr. Pomeroy[9] on this topic will be quoted, and though he speaks continually of aluminum, it is clear from the context that he means an aluminum alloy, and almost certainly has duralumin in mind:

"There is no doubt that the development of the forged aluminum connecting rod follows logically from the aluminum piston, to which many makers have been forced to return, and for the same reason, the reduction of internal wear and tear in engines by 50 per cent and the vastly improved performance obtained thereby.

"The primary advantage of forged aluminum as a material for high duty connecting rods in high speed internal combustion engines arises from the fact that the chief cause of bearing wear and failure is the loading imposed upon the crankshaft and connecting rod bearings due to the inertia of the moving parts.

"In general the inertia effect of the connecting rod may be considered as if the weight of the big end were concentrated at the crankpin while the difference between this weight and that of the whole connecting rod, or the weight of the small end, is concentrated at the piston pin. For example, a steel connecting rod for a 3½-in. bore engine made as light as practicable weighs about 3.50 lb., of which 2.75 lb. can be reckoned as rotating mass and the remaining 0.75 lb. as reciprocating mass. In aluminum this could be reduced to 2 lb., of which about 1.5 lb. would be rotating and 0.5 lb. reciprocating mass.

"The effect of using an aluminum connecting rod would in such a case reduce the big end loading due to inertia, neglecting connecting rod angularity, in the ratio of 2.75 to 1.50 at the middle of the stroke, where the piston inertia forces vanish, and in the ratio of 5.75 to 4.25 at the ends of the stroke, an advantage in the reduction of the load factor varying from 40 to 26 per cent, or a mean reduction of some 33 per cent.

"The advantage thus obtained can be utilized by—

"(1) Reducing the width of the bearings by 33 per cent, which in turn reduces the overall length and the total weight of the engine.

"(2) Reducing the gear ratio and running the engine at a higher speed, thus obtaining a better performance with the same factor of bearing safety.

"(3) Improving this factor in engines that are unduly supplied with bearing surface.

"The effect of aluminum connecting rods on crankshaft bearing design is important. Many engine builders use counter balanced crankshafts to reduce main bearing wear, particularly on the middle main bearing. There are, however, certain distinct objections to this practice. In the first place, a counter balanced crankshaft is heavy and expensive, and in the second place it introduces a distinct liability to torsional periodicity, particularly in six-cylinder engines.

"The necessity for such crankshafts arose from the bearing wear that was due in turn to heavy pistons and connecting rods. The use of aluminum rods reduces very considerably the crankshaft skipping rope action which causes bearing wear. It is safe to say that in combination with aluminum pistons, counter balanced crankshafts are unwarranted and disadvantageous."

Wrought Aluminum Alloys

For the manufacture of connecting rods in which a reliably high strength and high ductility are required, the cast aluminum alloys are not particularly suitable. The strength of the alloys in the cast state has been given already, and it is clear that the best that can be produced at present on a commercial basis is about 12 tons per sq. in. This gives a strength-weight ratio of 4, and is associated with poor ductility. The best commercial wrought alloys, on the other hand, give a maximum stress of about 26 tons per sq. in., which corresponds to a strength-weight ratio of 9.3. The corresponding ratios for 55-ton alloy steel and 35-ton carbon steel are 7.2 and 4.5. Evidently the wrought light alloys compare very favorably with the steels—in fact, they are generally superior to them on this simple basis, while the cast alloys are inferior.

In view of the nature of the duties which the metal in a connecting rod has to perform, it is very evident that the fatigue strength of the metal is of supreme importance, and that a comparison based on this property is of exceedingly great value. To be quite fair again the values for the different alloys should be compared on a weight basis; that is, the standard of comparison should be the ratio of fatigue-strength to specific gravity—the resulting

*Condensed from the second part of a paper presented before the British Institution of Automobile Engineers.

[9] See Jour. S.A.E., Vol. XI., No. 6, p. 508.

ratio being on all fours with the strength-weight ratio already quoted. In Table 26 the values of the fatigue-strength-weight ratio are displayed for the cast alloys, a representative wrought alloy, and the two typical steels already referred to. The figures in that table indicate the supremely good properties of the wrought light alloy when compared on this basis.

Wrought light alloys at present available include those with a basis of aluminum and those with magnesium as the predominating element, and there are various metals in both groups. At this date the wrought alloys of aluminum are for more advanced in their development than are the alloys of magnesium, though among those of aluminum the only one that is on a commercial basis of production is duralumin, which may be taken as a typical representative of this class of alloy.

Duralumin is a complex alloy of aluminum, containing as its main constituents copper and magnesium, but also having important though small proportions of silicon and manganese. The total proportion of alloying elements is about 6 per cent. Conspicuous among its properties is the fact that duralumin is susceptible to heat treatment. It may be stated generally that this property of aluminum alloys generally accompanies the presence of magnesium in them. The heat treatment consists of two definite parts. First, the alloy is heated to a temperature of 480 deg. C. and then quenched in water. Second, the quenched alloy is "aged"; that is, allowed to stand at the ordinary temperature of the atmosphere for a period of several days. In the quenched state—that is, immediately after cooling—the mechanical properties of the alloy are not remarkable, but during the aging process they improve—rapidly at first and more slowly afterward—till after a time, usually about five or six days, the properties become practically steady and constant. The tensile strength of the alloy at the different stages during the process of aging after quenching is shown in Table 27. The maximum stress eventually and permanently attained by the alloy is not less than 25 tons per sq. in., and this may be taken as the working value for duralumin.

If the alloy is reheated it does not begin to lose its strength until it has attained a temperature of about 200 deg. C. Above this temperature it loses more and more strength until finally the minimum strength is reached at a temperature of about 350 deg. C. If the alloy is cooled slowly from this temperature—that is, in air—its maximum stress is about 16 tons per sq. in. Even if duralumin is quenched in water from 350 deg. C. and then aged, its strength is not materially affected, there being no further hardening. In the 16-ton condition the alloy is quite stable and has constant properties. For the manufacture of connecting rods duralumin is clearly only of interest in its fully hardened and aged condition, but for other purposes the fully softened condition, the 16-ton condition, is of particular interest.

Among the magnesium alloys no one wrought alloy has as yet stood out so conspicuously as has duralumin among the alloys of aluminum. There are, however, some definite prospects with regard to these materials, as can be shown by the tests made upon various alloys prepared in this country and in Germany and France. Several different kinds of alloy have been prepared in the wrought state—probably the best known up to the present being Electron, an alloy of German origin. The mechanical properties of some of these magnesium alloys when wrought are set out in Table 28. It seems very probable that forged magnesium, in the commercially pure state and without any alloying element, will prove to be as satisfactory as some of its allays.

In view of their extreme lightness and fairly high strength, the strength-weight ratios for the magnesium alloys come out at a very favorable figure, as shown in Table 29.

Duralumin Easily Forged

For the manufacture of connecting rods in duralumin, drop forgings are practically essential. Fortunately, this is quite a reasonable requirement, and suitably designed drop forgings can be produced without difficulty. The heat treatment of the rods is done when the drop forging is made and only the machining remains. This can be carried out with about the same cutting speeds, tool angles and lubricants as are employed in the machining of the cast alloys.

Table 26—Fatigue-Strength-Weight Ratio of Various Engine Materials

Material	Condition	[10]Fatigue-Strength÷Specific Gravity
35-ton steel	Wrought	2.16
55-ton steel	Wrought	3.50
Duralumin	Wrought	3.72
Aluminum + 13 per cent zinc + 3 per cent copper	Cast	1.0
Aluminum + 8 per cent copper	Cast	1.04
Aluminum + 12 per cent copper	Cast	0.94
Delta metal	Wrought	1.24

[10] The fatigue "strength" is taken as half the "range"—for example a strength of 10 tons for a range of ± 10 tons.

Table 27—Change of Maximum Stress of Duralumin During the Aging Process

Time After Quenching, Hours	Max. Stress, Tons Per Sq. In.
0	16.5
5	18.5
10	21.5
15	23.5
20	24.5
25	25
30	26
35	26

Table 28—Mechanical Properties of Various Wrought Magnesium Alloys

Alloy	Max. Stress, Tons Per Sq. In.	Elongation, Per Cent
Magnesium + 13 per cent copper	15.0	6
Magnesium + 3 per cent zinc	13.9	9
Magnesium + 6 per cent aluminum	18.7	8.0
Electron Metal	17.6	11.0
Magnesium + 3 per cent copper	12.0	7.0
Magnesium + 1 per cent cadmium	14.1	5.0

Table 29—Maximum Stress-Weight Ratio of Various Wrought Magnesium Alloys

Alloy	Specific Gravity	Max. Stress÷Specific Gravity
Pure magnesium	1.74	9.1
Magnesium + 13 per cent copper	1.95	7.7
Magnesium + 3 per cent copper	1.77	6.8
Magnesium + 3 per cent zinc	1.77	7.9
Magnesium + 6 per cent aluminum	1.78	10.5
Magnesium + 1 per cent cadmium	1.76	8.0
Electron metal	1.84	9.5

Table 30

Reheating Temperature, Deg. C.	Max. Stress, Tons Per Sq. In.
...	30.4
100	30.2
200	27.8
300	19.2
400	17.8
450	19.6
475	20.8
500	22.2

Table 31

Duralumin stamping before machining	12	oz.
Steel stamping before machining	25	oz.
Duralumin rod, machined, assembled and fitted with big-end bushes	15¼	oz.
Steel rod, machined, assembled and fitted with big-end bushes	25	oz.

Table 32—Tensile Tests on Specimens Cut from Duralumin Connecting Rods

Position of Test Specimen	Yield Point, Tons Per Sq. In.	Max. Stress, Tons Per Sq. In.	Elongation, Per Cent
Web	19.2	29.2	14
Flange	22.2	30.4	14
Flange	21.5	29.5	17
Web	21.2	25.9	16
Flange	18.7	26.4	18
Flange	20.7	29.8	20

Table 33

Specific gravity	2.80
Max. stress (15° C.), tons per sq. in.	26.5
Max. stress (200° C.), tons per sq. in.	24.5
Max. stress (300° C.), tons per sq. in.	20.0
Young's modulus, tons per sq. in.	4400
Coefficient of expansion	0.00002261
Thermal conductivity (silver = 100)	31
Temp. in deg. C. of first melting	545

Some reference may be made here to the risk of fire in the machining of magnesium alloys—not those of aluminum. Actually, with magnesium alloys there is but little likelihood of fire except in the finest pieces of metal. Ordinary turnings do not burn at all readily. In fact, some pains have to be taken in order to ignite them. With large lumps the difficulty is considerably greater. Very fine turnings, or particularly the swarf from grinding operations, however, ignite fairly readily. A hot spark from grinding a steel tool, falling into a pile of swarf from a magnesium alloy, is often sufficient to ignite it. No attempt should be made to quench the fire with water as magnesium decomposes water—even explosively at high temperatures. If it breaks out, the fire should be smothered with dry, not wet, sand.

Dies for Duralumin Rods

In connection with the use of duralumin connecting rods, one or two important points ought to be mentioned. The first is in regard to the design of the stamping. It may be taken that the majority of duralumin rods that have been employed up to the present time have been put into engines in which steel rods have performed, and are still performing, satisfactorily.

Duralumin rods often have been made to the same patterns, and often in the same dies, as the steel rods they are to replace. In many such patterns the form of the steel stamping has not been quite suitable for duralumin, because the profiles have been too sharp and the corners too square. In forging, duralumin does not flow quite so readily as steel, and the presence of the sharp corners and sudden changes of section have sometimes been detrimental. If these points are avoided, the production of duralumin rods is quite a straightforward matter. American engineers have adopted the practice of preparing specially cut dies with sweeping curves with gratifying results. In some instances the resulting rod is not quite so light as it would have been if made in the dies for the steel rod, but even so it is not more than about one-half the weight of the steel rod that it is to replace.

One very important matter in connection with light alloy rods is the white metaling of the big end and the fitting of a bearing in the small end. Attempts have been made to use duralumin as a bearing metal; that is, to run the big end directly on the crankpin. Such experiments have not by any means been devoid of success, particularly when the crankpin was thoroughly hard. One American firm claims to have made quite a success of this practice. It seems now to be fairly general to allow the piston pin to float and to run directly on the duralumin in the small end of the rod, but to provide a white metal bearing of the usual type in the big end.

The white metaling of the big end provides a little problem. With steel rods the exposure of the metal to the temperatures from which white metal customarily is cast (some 350 deg. C.) does no harm. On the other hand, if fully heat treated duralumin is heated up to this temperature (as it would be if the rod were dipped into the white metal) it would be permanently softened. Rehardening of the rod after white metaling would be quite out of the question. The softening of duralumin is illustrated by the test figures given in Table 30, which represent the maximum stress of duralumin after it has been fully hardened (and then permitted to age) and then reheated to the temperatures shown in the table, followed by cooling in the air. If, therefore, a duralumin rod were exposed to this relatively high temperature of 350 deg. C., it would be softened in precisely the most dangerous place—the shell of the big end.

The practice of casting in the white metal is followed in America by some reputable firms, who presumably make the shells of the big end sufficiently strong to counteract the softening effect of the operation. The practice of one such firm (a practice which betrays a desire not to overheat the rod unduly) is as follows: The rods are heated in a lead bath to 100 deg. C., and thence transferred to a bath of molten tin where a rotating wire brush slightly larger than the hole that is to be white metaled is used to escape the surface of the orifice. The tin then plates well on to the rod, after which the operation of casting in the white metal is said to be quite easy.

Die-Cast Bearings Expanded in Place

A method of white metaling that is free from the reproach of modifying the mechanical properties of the duralumin is that of casting the white metal separately as a die casting and then expanding it in the big end of the rod by means of a swage. The holes in the big end are drilled or broached to size and the white metal shells are inserted by an arbor press and swaged into place by means of a broaching machine, the bar carrying a swage instead of a broach. This operation leaves the shell a little large for boring and reaming.

In yet other instances the duralumin rods are fitted at both the ends with phosphor bronze bushes, the white metal being omitted altogether. The decision as to whether or not this is the best practice will depend largely upon other considerations than the metal.

An interesting comparison between the weights of a steel rod and a duralumin rod made for the same four-cylinder 11.9 hp. water cooled car engine is shown in Table 31.

Clearly there is a very big saving in weight, and therefore in big-end loading, to be obtained by the use of duralumin.

Table 32 gives some actual results obtained upon test pieces cut from three points in two duralumin connecting rods made for the same light car. The first three tests are from a rod made in the same dies as a steel stamping, while the remainder are from a rod made in dies specially designed for the manufacture of duralumin rods. The alloy in both the rods had a specific gravity of 2.81.

Forged and Stamped Pistons

In a paper on this subject it would not be fitting to omit all reference to the use of pistons made from light alloys in other than the cast condition. Cast pistons generally have been favored in the past mainly on the score of convenience in production, and also very often because no other kind of piston has been seriously imagined. Steel drop forged pistons, however, are by no means unknown, and a good deal of recent work has been done in the direction of making and using light alloy pistons that are either forged or pressed. Very much the same wrought alloys as those already described, both of aluminum and magnesium, have been employed for this purpose. Mention, however, should also be made of commercially pure magnesium. These various metals are quite well suited for the purpose suggested and, provided that due forethought has been exercised, they have given very good results.

When using alloys of this kind, for example, duralumin or magnesium or the magnesium alloys, consideration must be given to the possible changes of volume that they may experience in service. It already has been demonstrated that some of these alloys are generally put into states which, although perfectly stable at ordinary temperatures, and in fact up to some 200 deg. C., are not equally stable at temperatures above this. Such materials, when heated to temperatures much higher than 200 deg. C., begin to change, or actually change completely, into a form that is stable at these and lower temperatures. This change already has been demonstrated in the case of duralumin (see Table 30) because it is reflected in the tensile strength of the alloy. Naturally, if while running as a piston an alloy is going to be depreciated in strength it is very necessary to take account of this fact at the start and to design the piston accordingly—on the basis of the lowest tensile strength that the material is likely to reach during service.

Heat Treatment a Necessity

A further point connected with the changes that may be endured by these alloys at high temperatures is that the alteration in structure not infrequently brings with it a slight change in volume. This is usually a permanent change and may affect the clearances between the piston and the cylinder. This possibility should be discounted by softening the alloy before service at a temperature not less than that which it will attain during service in the engine.

In order to render comparison with the cast alloys feasible, the physical and mechanical properties of duralumin as a whole are given in Table 33, which corresponds with Table 25.

Y alloy is as servicable as duralumin for the manufacture of these forged light alloy pistons, and as a matter of fact is somewhat stronger at temperatures over 300 deg. C., and to this extent has an advantage over the better known material. Duralumin has the advantage at low temperatures, but Y alloy at high temperatures; and, therefore, although duralumin can be taken as an entirely typical forged alloy for connecting rods, it has to share this position with Y alloy when forged pistons are under consideration. Y alloy can be forged quite satisfactorily, and it might be preferable to use Y alloy under certain circumstances. The difference between Y alloy and duralumin at high temperatures is not exceedingly great, and if the working temperature of the piston does not rise beyond 300 deg. C there is no obvious advantage in the use of Y alloy. In automobile work it is improbable that pistons are run with such a small margin of safety that the difference between the two alloys becomes important. That is not the case with aero work, but that is another matter.

Measuring Temperature of Knight Engine Parts

TESTS calculated to determine the temperature of various combustion chamber parts of a Knight engine while it is in operation are being conducted at the Bureau of Standards. Temperature measurements are made with thermocouples and a potentiometer. Some of the couples are located in stationary parts such as the cylinder head and walls and there is no particular difficulty attendant upon securing the desired data by this means.

In the case of moving parts, however, the problem is more difficult. Couples are peened into holes made in the sleeves, the fine lead wires being cemented into grooves milled in the walls of the sleeves. At the lower end of the sleeves the leads are lashed with silk floss to piano wire springs and ultimately come through holes in the crankcase near the stationary ends of the springs.

On account of the greater stroke of the piston, the couples in this part are connected to leads which pass through a tube bolted solidly to the piston and offset at the lower end to clear the crankshaft. This tube slides up and down through a packed gland in the oil pan and the couple leads are carried from the end of the tube on a sort of walking beam which oscillates with the tube at one end and is anchored to a supporting link at the other. The leads run from the beam to this link and thence from the stationary end of the latter to the potentiometer.

To date runs at 400 and 800 r.p.m. with different mixture ratios, spark advance and jacket water temperatures have been made with the loss of only two thermocouples, but the five couples in the piston went out of action before any results at 1200 r.p.m. could be recorded, due to the fact that the leads broke off at the point at which they leave the tube. Repairs now are being effected. Results of the test are not yet available for publication.

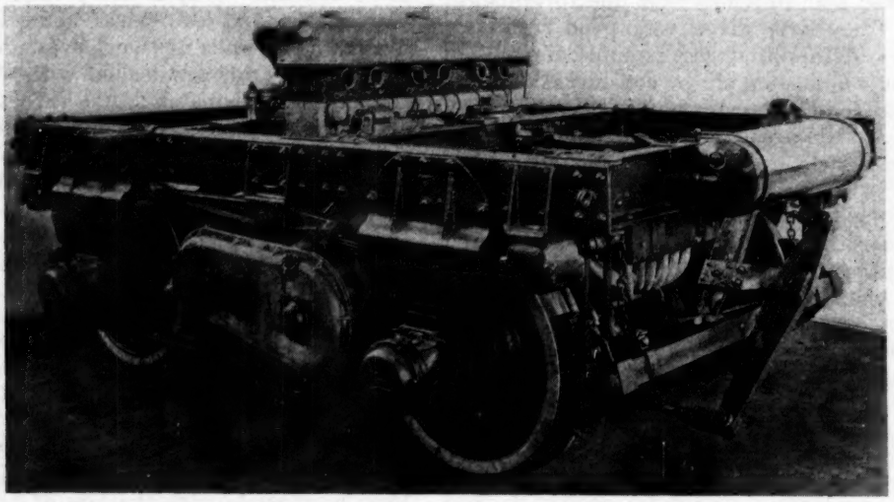
THE work which the Bureau of Standards is carrying on in cooperation with the A. S. T. M. on the corrosion of metals is beginning to yield some interesting data. There is, however, the difficulty of interpreting the information obtained correctly, and until this can be done with greater certainty it is not wise to draw definite conclusions. One surprising feature of the work is that at least in the case of some alloys the alternative immersion test, in which the specimen is first suspended in air and then in the corrosive medium is not as severe as the simple immersion test. A great deal of work has been done in the comparison of methods of suspending the specimen in the corrosive medium and tentative conclusions have been drawn as to the most suitable method for specimens of several shapes.

Mack Builds Railcar Which Will Make Railroad Coaches Convertible

Develops electro-pneumatic remote control system which makes possible train of two or more cars operated by one crew. Equal speeds in both directions attained. Replaces 120 hp. six cylinder special with standard truck engine. Drive on each axle.

A GREAT deal of development work in connection with motor railcars has been done during the past three years by Mack Trucks, Inc. The company, at the beginning of this period, saw a field for gasoline railcars on non-paying railway lines and built cars which were essentially Mack trucks converted for use on rails, although two of its models use practically nothing but the AC engine and cooling system, which are standard, the frame, leading and driving trucks, transmission, air brakes and springs being special.

Later a special six-cylinder engine of 120-hp. output at 1200 r.p.m. was designed and an experimental car with this engine built. The engine had an aluminum crankcase and an aluminum cylinder block with steel cylinder liners, the more severe stresses due to inertia forces and explosion pressures being taken on steel through-bolts which extended from the main bearings up through the crankcase, cylinder block and cylinder head, holding these parts together.



Mack railcar truck. (This photo shows the truck equipped with the large six-cylinder engine which has been replaced by a four-cylinder truck engine)

To insure practical freedom from vibration and reduce bearing loads to a minimum, the crankshaft was made of the unusually large diameter of 4 in. (for a 5¼ by 7-in. cylinder) and was counterbalanced, and all of the bearings were made of liberal length. There were two exhaust valves per cylinder. A single inlet valve large enough to give good volumetric efficiency presented no problem, but it was thought advisable to use two smaller exhaust valves which can be kept at a lower temperature and which distort less than a single exhaust valve large enough for a 5¼ by 7-in. cylinder.

As insurance against ignition trouble the engine was fitted with two magnetos and an additional battery system, making three separate ignition systems. The valves were actuated through an overhead camshaft.

This engine was built into a truck which was fitted under a 55-ft. car arranged to seat 51 passengers and having a baggage space 13 ft. 9 in. long.

Tests of this AH car showed the practicability of the electro-pneumatic remote control system and brought out the possibility of using two 60-hp. engines instead of one 120 hp. engine. Then, after a car with two engines was laid out, the costs of manufacturing both types were studied, it was found that the double engine car could be produced for much less money than the AH. This difference in cost is due to the fact that use can be made of the standard AC engines, clutches and transmission parts, which have been in quantity production for years. There is a further advantage in this design in that spare parts are already stocked at all branches.

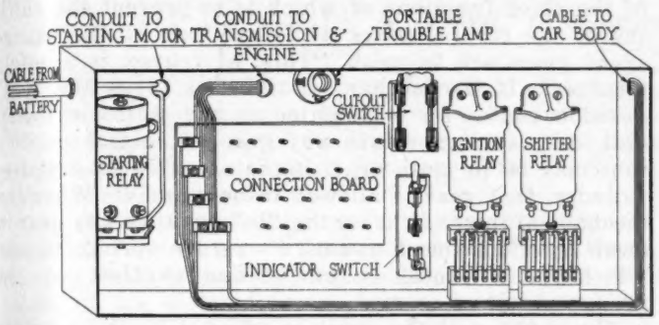
Even with the most optimistic estimate of the number of cars the railroads may use, the volume of production of an engine having no other market, can never reach the volume of standard truck engines.

The unit really developed by Mack Trucks is a power truck to go under railcars. Such a truck may be used at one or both ends of a car, and two or more cars may be connected into a train and operated from either end by means of the electro-penumatic remote control system. The engine is located at the middle of the truck and occupies no room inside the car body. This, of course, is of considerable advantage to operators, for an engine compartment at one end of the car would add 9 to 10 ft. to the length required and considerably to the total weight.

Many other advantages are seen by the manufacturers in the plan of a self-contained power truck. For instance, an operator having a number of railcars of this make could have one spare truck which could be quickly substituted for a truck if the engine required overhauling or which was rendered unserviceable for any other reason. There is a certain amount of vibration with any

engine at certain speeds, and if the engine is mounted on the truck instead of in the body, this vibration will not be felt by the passengers to the same extent.

Having a self contained power truck the company can sell to railroads for conversion purposes, although it is realized that the standard car bodies are unduly heavy and that not as high efficiency can be attained with such



Control cabinet on truck

motorized coaches as with special designs of railcars with light bodies.

Another advantage of the plan of mounting the engine directly on the truck is that it is located close to the drive axle and that the drive is therefore short. With the engine on the truck instead of in the car body it was impossible to use a straight mechanical control and an electro-pneumatic remote control system was therefore developed. The actual work of shifting the gears, releasing the clutch, etc., is done by compressed air, but the piping between the source of this air, the control valves and the operating cylinders is short, while the transmission of the effort required for operating the control from the operator's compartment to the power plants, which is comparatively a long distance, is effected electrically. This system makes it an easy matter to duplicate the control at the other end of the car and even in another car.

With this control system it is possible to use the standard 60-hp. truck engine on a 55-ft. car by mounting one engine on each truck. Both power plants are controlled by the same levers, and the load is at all times divided substantially equally between them. The engine referred to has a bore of 5 and a stroke of 6 in. and is the four-cylinder type. It has a displacement of 471.2 cu. in., as compared with 909 cu. in. of the six cylinder.

Throttle Has Wide Range

The throttle is controlled electro-magnetically by means of solenoids. There are three separate solenoids which move their cores, connected to the throttle, ⅛, ¼ and ½ in., respectively. Any solenoid can be energized separately, any two can be energized simultaneously or all three together, making it possible to give a ⅞-in. motion to the throttle in steps of ⅛ in. Including the closed position, in which all of the solenoids are disconnected from the source of current, there are eight different positions, the throttle is returned or closed by means of a spring. There is one of these throttle controls on each engine, but both controls are operated by the same switch and the throttles on the two engines are always in the same position.

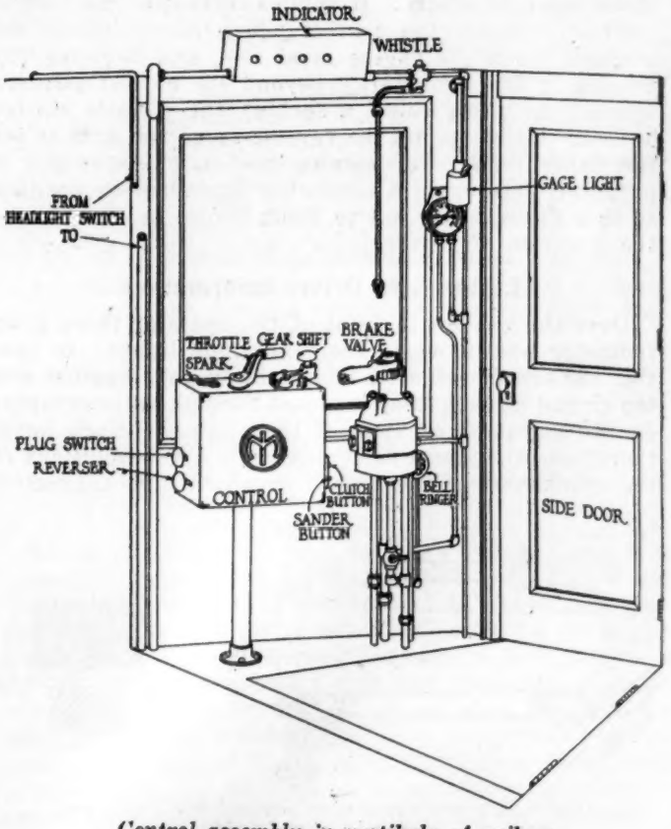
Owing to the fact that the two engines are friction-geared together through the rails the engines always run at the same speed, and with the same throttle opening they develop substantially the same power.

The general arrangement of the variable gear and the drive to the axle is shown in the perspective drawing herewith. At the rear end of the engine is located the combined flywheel, clutch and cooling fan, the cooling system being of the same type as that which has been used in Mack trucks for some time. On an extension of the clutch shaft, which is splined, there are two sliding gears which give the forward and reverse speeds. There is never any direct drive right through the gearbox. For the reverse motion the larger of the two gears on the clutch shaft is meshed with its mating gear on the upper of the two parallel shafts in the gearbox, this latter shaft being in two sections which can be locked together by means of a positive clutch, in which case the power is transmitted directly through this shaft to the double reduction gear on the driving axle; or the power may be transmitted from the forward section of the upper shaft through a pair of constant mesh gears to the lower shaft and back to the rear section of the upper shaft through any of three pairs of spur gears, thus affording four speeds in the reverse direction.

Same Gear Ratio Forward or Back

For forward running the smaller of the two gears on the clutch shaft is slid into mesh with its mating gear on the lower transmission shaft, and from this shaft the power is transmitted to the rear section of the upper shaft through any of the three pairs of gears which are also used for the reverse motion. It will be noticed that there are three sets of sliding gears, each set being operated by means of an air cylinder. The three shifter rods are interlocked, so that any rod can be shifted only when the other two are in the neutral position, in which they are locked. This locking bar is operated by a separate air cylinder. The reversing gears have such ratios that the same speeds are obtained in both directions.

The final drive to the truck axle is through a combined bevel and spur gear set or a double reduction drive as it is called in truck parlance. Two universal joints are incorporated in the propeller shaft. The bolster is located unsymmetrically with respect to the two axles,



Control assembly in vestibule of railcar

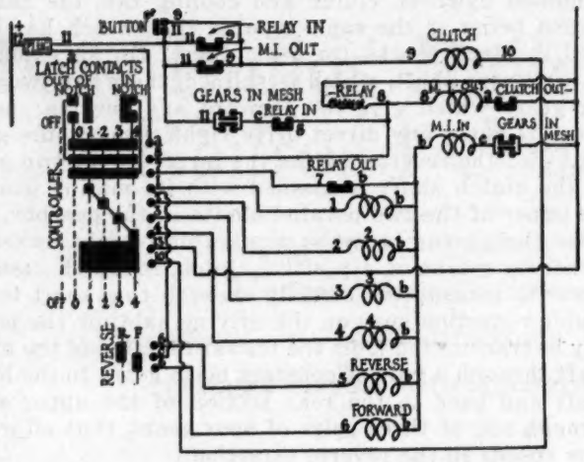


Diagram of electric control connections

with the result that the driving axle takes about two-thirds of the weight on the truck.

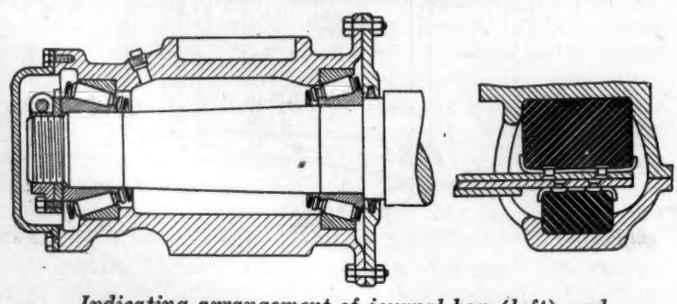
Owing to the use of two engines, one on each truck, two-thirds of the entire weight of car and load is made available for traction purposes, whereas with a single engine only one-third of the weight can be utilized. Of course this increased traction is not needed normally, but conditions such as a combination of an upgrade and icy rails, bucking snowdrifts or switching freight cars might make this increased traction quite desirable.

The controller is of the drum type in which a number of stationary contact fingers (represented by the figures in the vertical column) establish electric contact with metal segments on a drum of insulating material. A development of these segments together with the electrical connections is shown in the diagram herewith.

Referring to the view of the control box in the vestibule, it will be seen that there are two switches on the left side of the box. Forcing in the plug switch has three separate effects: It applies current to the control system; it opens the contact which short-circuits the magneto when the engine is at rest, and it closes (by forcing it in momentarily beyond its normal position against the pressure of a spring) the electric starter switch. By means of the reverse lever the gear is set for either forward or reverse motion. This switch is purposely located in a somewhat inconvenient position so that the operator has to think before he can reverse the direction of motion.

Lights Give Driver Information

Over the window in front of the operator there is an indicator box in which there are four lights. In case two car trains are used there will be four engines and the circuit of each lamp is closed through an interruptor on the camshaft of each of the engines. Each lamp, therefore, will give a flash once every two revolutions of the crankshaft of the engine to which it is connected, and the signals of these indicator lamps show that the ignition is on, that the engine is turning over and approximately how fast. If the wheels should spin in starting this is shown by the indicator.



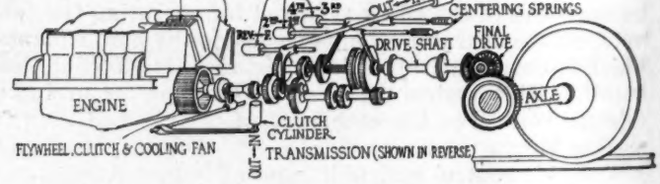
Indicating arrangement of journal box (left) and spring bracket (right)

Precautions Taken for Shifting Gears

Reference has been made already to the interlock, one of the chief functions of which is to prevent the shifting of the reverse gears while one pair of the change speed gears are in mesh. This, of course, is a safety measure. If the mechanical interlock is on the "out" position and no air is admitted to any shifter cylinder, balancing springs return any gear to neutral position that may be in mesh or, if air is admitted to a shifter cylinder, that gear is allowed to be meshed. When the mechanical interlock is on the "in" position, any gear in mesh is held in mesh against its return spring; the air which put it in mesh is shut off and no other gear can be moved out of neutral.

The shifting of the gears is effected by the pressure of the air against the pistons in the shifter cylinders. The air used is taken from the supply for the Westinghouse air brakes. The valves admitting the air to the shifter cylinders are operated electromagnetically.

New practices in the design of railroad equipment are introduced in the truck, which is comparatively light. Some of the features are adaptations from motor truck design, as, for instance, the use of taper roller bearings on the axles and of semi-elliptic springs, one end of which is connected to the frame by a rubber shackle. The bearing pedestals, however, are of such design that



Perspective view of four-cylinder engine, change gear and drive

other types of bearing, including M.C.B. brass bearings, could be substituted later on should this be found desirable.

With the power truck above described Mack Trucks are in position to make up various types of cars and trains. A light car may be built with a single power truck or a heavier one with two such trucks. In addition two or more motor railcars can be operated coupled up into a train, with a single crew. One of the advantages of having two power units on a car is that if one fails the other will carry the car to its destination and it need not be hauled by a locomotive, which is always an expensive procedure. Service parts for the engine used are available in practically every large city in the country, hence can be had with little delay, and, besides, with the smaller engine one man can lift almost any part without the use of a tackle.

IN a report by the manager of the Bradford (England) municipal street railway system it is suggested that as soon as the trucks wear out the existing routes should be converted for trackless vehicles. The suggestion seems to be to employ trackless trolley cars, for in the estimate of costs of the change-over there are items for overhead line and return feeders. No allowance is made for the cost of cars, as they would have to be provided in any case. The average life of tracks is placed at 15 years.

New Export Classifications Put in Force

Simplified form of declaration with names and code numbers given shippers to foreign countries. Automotive Division of the U. S. Dept. of Commerce acts after month's study.

STANDARDIZATION and simplification of automotive export declaration figures, which has been made the basis of a study for the past month, has been completed by the Automotive Division of the U. S. Department of Commerce.

One of the outstanding needs of the exporter is a simplified form of export declaration, and Percy Owen, chief of the automotive division, detailed the entire personnel of his division to the solving of this problem. The first step, creation of an automotive export classification, has been completed and will ultimately appear in the form of a brochure for handy reference of automobile exporters. Meanwhile the classifications are being sent out in circular form for the use of the trade.

The statistics of exports of automobiles and other commodities from the United States, as published by the Department of Commerce, are based entirely on the returns made by the shippers in their export declaration.

A great deal of confusion and misinformation has been disseminated by the exporter's misunderstanding of the declarations in their export returns, with the result that automobile export statistics are somewhat inaccurate. As an example, some exporters used the factory price for export figures, others used the retail selling price, while still others used the factory price plus the cost of packing and freight to seaboard.

Again, hundreds of kinds of accessories were listed under the general nomenclature of "accessories," and there has never been an accurate compilation of export figures on different classes of accessories, as will be the case under the new export declarations.

Code Number and Name Required

In making his declaration an exporter gives the commodity both by name and by code number—these codes supplied by the Government. In compiling the export data the Census Bureau uses the commodity numbers.

The principal classifications and sub-divisions of the automotive exports listed with the United States Customs henceforth will be as follows: (The number preceding the commodity is given arbitrarily in order to facilitate its transmission by telegraph for monthly reports.)

I. For Motor Vehicles and Chassis

Passenger cars, except electric—
7920—Valued up to $500
7921—Valued over $500 up to $800
7922—Valued over $800 up to $2,000
7925—Valued over $2,000

(*Note—For classification purposes only, use wholesale factory price without any additions. However, values stated in Shippers Export Declaration should be wholesale price, plus packing charge; and, if shipment is not on through bill of lading, should also include freight from factory to seaboard.*)

Commercial vehicles, except electric—
7909—Commercial motor cars

(*This heading covers a light car used primarily for delivery purposes and light trucking and NOT exceeding $800 wholesale price. However, values stated in Shippers Export Declaration should be wholesale price plus packing charge; and, if shipment is not on through bill of lading, should also include freight from factory to seaboard.*)

7910—Motor trucks and buses up to 1 ton inclusive
7912—Motor trucks and buses from 1 to 2½ tons
7914—Motor trucks and buses over 2½ tons

Electric trucks and cars—
7905—Electric commercial cars and trucks
7906—Electric passenger cars

Motorcycles and parts—
7952—Motorcycles
7953—Parts of motorcycles, except tires

Note—Under "Parts of motorcycles" are included parts of bicycles and tricycles.

II. For Motor Vehicle Engines, Electrical Equipment Unit Assemblies, Parts, Accessories, Service Equipment as follows:

Automobile engines—
7053—For motor trucks and buses
7056—For passenger cars

Electrical equipment—
7118—Storage batteries
7190—Spark plugs, magnetos and other ignition apparatus

Unit assemblies—
7926—Automobile unit assemblies

Note—This covers complete assemblies in units such as axles, steering gears, transmissions, clutches, universal joints, wheels, radiators, etc.

Parts—
7927—Automobile parts for assembly
7928—Automobile parts for replacement

Accessories—
7930—Automobile accessories

Service equipment—
7932—Automobile service appliances not elsewhere specified

III. For Trailers

7939—Trailers

Note—Includes high-speed trailers for use in conjunction with motor vehicles. Heavy duty trailers pulled by tractors fall in the province of the Agricultural Implements Division of the U. S. Department of Commerce and are not listed by the Automotive Division. Both, however, are to be listed hereunder.

IV. For Motor Boats and Small Marine Engines

7956—Motor boats, which includes all boats equipped with internal combustion engines other than Diesel or semi-Diesel
7046—Detachable marine engines
7049—Motor boat engines other than detachable

V. For Aircraft and Engines for Aircraft

7941—Airplanes and seaplanes
7945—Other aircraft
7949—Parts of aircraft, except engines and tires
7058—Engines for aircrafts

All of the above classifications are now in force and cannot be changed before Jan. 1, 1925. Meanwhile the Automotive Division is preparing its "Automotive Exports Classification List," which will show in detail the hundreds of kinds of accessories, giving to each accessory and automobile unit a code and classification number under Export Schedule B to be used by shippers when making out declarations.

It is the hope of the division that these lists, with cross indexes, can be finished and published in the next two or three months and be available for the public.

Demand for More Durable Finishes Stimulates New Developments

Phenolic condensates and rubber are among materials now being experimented with. Varnish systems greatly improved. Physical tests better than chemical ones.

FROM the standpoint of the automotive body finisher, several points of practical interest and information were developed at the meeting of the Paint and Varnish Section of the American Chemical Society at Washington, D. C., last week. Although the greater portion of the papers and discussion were founded on the chemist's view of paints and varnishes, the general tendency to get down to fundamentals, which is on the increase in all scientific organizations, brought out practical information which is of immediate value to those interested in the application of body finish or its testing for the purpose of checking durability.

An instructive paper by H. C. Mougey, Control Chemist of the General Motors Research Corp., made it clear that recent developments in highly durable cellulose nitrate finishes has stimulated interest in the perfection of other finishing materials not now generally made by the paint and varnish industry and has also resulted in great improvements in the durability of varnish finishes. Phenolic condensate products and coatings of rubber composition are among the newest finishing materials for automobiles to receive consideration.

Of outstanding importance were the repeated statements that chemical tests are rapidly being supplanted by physical tests for the checking of varnish quality. In each case the necessity for checking the varnish or finish under conditions comparable to its actual use were emphasized. Laboratory tests, as represented by developments up to date, are only valuable in the comparison of similar preparations and within this limitation serve as an index of relative durability. In the varnish field the most satisfactory laboratory test for comparative durability, and one which apparently gives a rather accurate check on this factor, is the Kauri reduction process.

THE durability of automobile finishes now available is believed to be at least double that of most finishes which were on the market two years ago.

Cars which become dull and unattractive after a few months of service are not a good advertisement for those who build and sell them. The industry in its entirety should give heed to facts such as are set forth in this report concerning the better finishes now used by some concerns including some large producers.

In this test the varnish, which usually consists of a long oil, is shortened by the addition of a Kauri gum solution which is commercially inelastic, until brought to a fixed minimum standard of flexibility. The ratio of gum solution to the volume of varnish which is required to produce this effect is designated as the Kauri index, and experience has demonstrated that this figure supplies an excellent empirical value for the relative flexibility and durability of the varnish.

All Coats Must Be of Consistent Quality

Discussion developed the point that good finishing varnishes have no particular durability when applied over inferior undercoats and vice versa. All of the coats must be of a consistent standard of quality and, as the exposed surface is approached, each coat must be somewhat more elastic than those beneath. This axiom applies to paint as well as varnish.

Another factor which is taking on increased importance in physical testing is viscosity. When the color is properly controlled the thickness of the coating, and therefore the depth of the finish, is dependent upon this factor. Both paint and varnish manufacturers are now paying considerable attention to the maintenance of a definite standard of viscosity in order to produce the same color characteristics over a long period of production.

One of the features of the meeting which is of interest to the automotive industry from the commercial angle was the description of the advances which have been made in cultivating tung trees in this country. The tung tree is the source of chinawood, or tung oil, which has been used as the base of spar varnishes for many years and is now becoming increasingly important as the base of automobile body finishes.

The Olds color enameling process and the Oxvar system, both of which utilize tung oil, have been described in recent issues of AUTOMOTIVE INDUSTRIES. This oil is capable of withstanding higher temperatures than linseed oil and therefore is entering into the field in conjunction with line or quantity production of baked finishes in black and several other colors.

A substantial advance in this culture has been made at an experimental farm in Florida and many farmers of that State are now setting out trees. Approximately 25,000 seedlings have been delivered to about sixty Florida farmers within the past year and the experimental station has approximately 300 acres planted, with some of the trees already producing. Although commercial production is not immediately at hand, every indication of success is shown, the ultimate result of which will take the supply of tung oil out of its present precarious condition and make it an American product.

At present this oil is obtained from one of the interior provinces of China, being produced there in a small individual way and passing through many hands before reaching the coast. The American trees of sufficient age are producing excellent crops, and although a production of 2 qt. of oil per tree per year is all that is anticipated, one tree yielded approximately 4 gal. at the last harvesting.

In this connection it should be stated that the weight of oil is about 34 per cent of the total weight of the nuts. The American oil is much lighter than the Chinese and hardens more rapidly, both of which are desirable qualities. It is thought that this development will ultimately reduce the price of tung oil from the present figure of 40 cents per pound for the imported variety to 8 cents.

Exposure Tests Advocated

Exposure tests were discussed by Dr. P. H. Walker of the Bureau of Standards, who advocated that samples should be placed at an angle of 45 deg. above the horizontal, facing south. Theoretically, the angle of maximum exposure for any given point should be equal to the number of degrees of north latitude, but the 45 deg. angle is an excellent figure for any location in the United States. Direct exposure at this angle is much more effective than when sample panels are suspended vertically. The following tabulation indicates the theoretical exposure for the vertical position and the angle of 45 deg. as compared to the maximum possible exposure. The points are taken at Seattle and Key West as being indicative of the total range in this country:

	Ratio of Exposure to Maximum Possible	
Location.	Vertical Exposure	45 Deg. Exposure
Seattle	.74	.999
Key West.....	.41	.934

Dr. Walker cited his own experience in the statement that test panels placed at the 45 deg. angle deteriorated at twice the rate of those in the vertical plane when both faced the south, and that panels placed in a vertical southern exposure deteriorated twice as rapidly as those facing north.

Results of exposure tests should be carefully scrutinized, as deterioration is much more rapid in some seasons of the year as compared to others. A sample which is put out in the late fall will show a much higher durability than the same sample when exposed in the spring when durability is measured by the number of days of exposure required to break down the finish. Curves for this effect were presented by H. C. Mougey of the General Motors Research Corp.

Laboratory Tests Not Perfected

Developments in quartz lamp or ultra-violet ray investigation were the occasion for the expression of difference of opinion as to the value of this type of testing. This is due to the discrepancies between the action of the ultra-violet rays and the results of exposure tests. With the new apparatus, although it has been in use over a rather brief period, there is promise of securing results comparable to those obtained in natural exposure tests.

In discussing laboratory tests intended to determine the probable life of finishes, H. C. Mougey said that such tests should be supplemented with standard exposure tests as well as with tests under actual service conditions. He pointed out several reasons why laboratory tests do not always give results which are proportional to service tests. Among these were mentioned the fact that the durability of a finishing varnish, for example depends upon its elasticity, resistance to moisture and

AUTOMOBILE finishing has taken on a new aspect within the past two years. A growing demand for more durable finishes has been met by the development of new materials and methods as well as by marked improvements in varnishes, varnish systems and other features of the finishing art.

This report of a meeting of Paint and Varnish Section of the American Chemical Society contains an excellent summary of developments which have come to light within the past year or two in the finishing field and gives also information regarding tests of finishing materials which is of interest to the entire industry.

film thickness, but even though these factors are high, the varnish is quite likely to fail if not applied over suitable undercoats.

To illustrate this fact Mr. Mougey showed a slide made from a panel exposed to the weather for four and a half months. One of the varnishes used had a Kauri reduction test of 180 and is very durable when used over suitable undercoats. The other finishing varnished on the panel had a Kauri test of only 40 and even under favorable conditions is not highly durable. In the case in question both varnishes were applied over the same undercoat containing the ordinary rubbing varnishes which are not durable when exposed to outside weather conditions.

On this panel an uncovered portion of the rubbing varnish failed after 47 days of exposure, the varnish with 40 Kauri test failed in 123 days, while the varnish which showed 180 Kauri failed in 116 days, but the failure in the last case was due to the fact that the under coat failed and in turn caused the finishing varnish to fail with it. A long oil finishing varnish used over ordinary short oil rubbing varnish may thus be less durable than a short oil harder-drying finishing varnish.

Relative Elasticity of Coats Important

As has been pointed out by L. V. Pulsifer, unless the elasticity of the undercoats is increased gradually as the finishing varnish coat is approached, there is likely to be no definite relation between laboratory and service tests, said Mr. Mougey. In other words, the entire finish, dried as it would be in production, must be tested to arrive at correct conclusions regarding the life of the finish.

Continuing, Mr. Mougey said:

"Another factor which affects durability is the thoroughness of drying regardless of the undercoats used. As an illustration, we exposed over bare steel a black color varnish made by grinding black pigment in a 40-gal. ester-gum wood-oil varnish. On the first panel the varnish was air dried two days. On the second panel the varnish was baked 2½ hr. at 275 deg. Fahr., and on the third panel it was baked 1 hr. at 400 deg. Fahr. The durabilities of these panels were 3½ months for the first, 9 months for the second and 12 months for the third.

"In a similar manner if two varnishes of the same Kauri reduction are exposed over suitable undercoats, the one that dries better usually will be more durable and this difference in drying may overcome a very great

difference in the Kauri test. For example, a certain hard drying finishing varnish which has a Kauri reduction of 120 is slightly more durable on the average than another certain finishing varnish which is slower drying and which has a Kauri reduction of 180, both varnishes being exposed under similar conditions with suitable undercoats."

Scratching or abrasion may cause the failure of varnish in service and in such case a hard-drying varnish is likely to be the more durable. Such varnishes are used on wheels, said Mr. Mougey, but if both hard and soft varnishes are exposed to the weather on test panels the body finishing varnish, which is the softer, is quite likely to be graded higher.

Estimates of Durability Are Possible

These examples, it was asserted, illustrate the need for considering surface characteristics, service conditions and method of application. If this be done and suitable allowances are made, it may be possible to estimate the relative durability of finishes of the same type, especially if enough data are in hand to show the relation between laboratory and service tests. If dissimilar materials are tested, however, comparisons are more difficult.

Mr. Mougey said in reference to the use of ultra-violet light in testing finishes, that it is not difficult to secure failures but that it had not been determined as yet what the relationship is between tests made by this method and service tests when comparing materials of different types. He added that samples exposed directly to the light did not fail as rapidly as when exposed to the weather in the usual way.

After further tests made by exposing the panels during the day following soaking in water over night had proved unsatisfactory, they finally were mounted on a wheel which made two revolutions per hour and so arranged as to cause the panels to pass successively through a bath of distilled water and then under the light after an intervening period for drying.

Ultra-Violet Tests May Be Misleading

It was found that a certain cellulose nitrate finish which would stand exposure in roof tests for two years would fail in two days in such a test while finishing varnish that would fail in three months in roof exposure stood two or three weeks in the ultra-violet light test. It was then decided to try rotating the wheel 24 hr. per day but leave the light turned on only during the daytime. This has given better results, but the experiments have not yet been in progress long enough to formulate definite conclusions.

In concluding his remarks on this subject Mr. Mougey said in part:

"So-called accelerated tests are really identification tests in most cases. Instead of subjecting the material to be tested to a series of forces tending to destroy the material and having both those forces and the power of resistance of the sample changing in exactly the same manner as they would in actual service, the tests, as usually conducted, simply show how the sample reacts to the particular test. If our previous records have shown that a certain kind of material which reacts to several empirical tests in a certain manner is suitable for the use intended, another sample of the same type which gives similar results to the empirical tests should also be suitable, under the same conditions. However, another material of a different type, which fails to meet these tests, may or may not give better results in actual service."

A summary of H. C. Mougey's paper, entitled "Some Attempts to Obtain More Durable Automobile Finishes," which gives many details of recent developments in the finishing field, follows:

For several years the General Motors Research Corp. has been making a study of the methods and materials used in the painting departments of various automobile plants with a view to securing more durable finishes. A satisfactory finish must have a smooth surface as well as the desired color and luster; must be capable of sticking to the body; must give these qualities with minimum cost and in minimum time, and must retain them as long as possible.

The two general systems in use at the time this study was started were the baking enamel system and the varnish system, which latter required one coat of primer, 0 to 7 coats of surfacer, 1 to 5 coats of color, and one coat of finishing varnish. It was found that the baking enamel was much the more durable, but lost its luster in time due to microscopic cracks in the extreme surface. This luster can be restored, however, by use of a mild abrasive and a polishing oil.

Cracks which develop in ordinary varnish finish cannot be eliminated by polishing and the failure of the finish usually is laid either to faulty undercoats, to poor finishing varnish, or to the method of application.

Seasonal Effects on Exposure Tests

Tests made on panels exposed to the weather showed that those exposed in winter lasted much longer than those exposed in summer, due, it has been found, to the greater number of hours of sunlight in the warmer season. A finish which would last 75 days in summer was found to last more than three times as long in winter.

Test panels prepared with lap coats were employed to determine the cause of poor durability, and it was found that, in some cases, the primer and surfacing coats were very durable even when not protected by finishing coats; that the durability of color, rubbing and finishing coats was the same whether applied over the surfacing coats or over the bare metal, thus proving that the primer and surfacer coats were satisfactory as foundation for other coats.

Ordinary color and rubbing varnishes, however, are not durable and fail in 1 to 5 weeks when not protected by finishing varnish. The latter, however, is not always equal to the task of protecting the color and rubbing varnish, which cracks and causes failure of the finishing varnish also. This is the reason for the short life of many ordinary automobile finishes.

Curves indicating that the life of finishing varnishes increases to a marked degree as the life of unprotected rubbing varnish increases were shown. These curves were plotted from exposure tests of panels in which only half of the rubbing varnish surface was covered with the finishing varnish. The facts established by these data, however, apply only when the finishing varnish is sufficiently durable to profit by the durability of the color and rubbing varnishes used under it.

How Maximum Wearing Quality Is Obtained

Maximum durability is obtained by using very durable finishing varnish over undercoats of high durability. The finishing varnish should be more elastic than the undercoats, but a medium grade finishing varnish which dries to a hard film may give better service over undercoats of color and rubbing varnish of low durability than will a more elastic finishing varnish which does not produce such a hard film. Poor finishing varnish will not give best results, no matter how good the undercoats may be.

These facts lead to the conclusion that the durability of automobile finishes can be greatly improved by the

use of durable rubbing and color varnishes with a top coat of truly durable finishing varnish. Systems based on this principle are now in production. It is necessary to bear in mind, however, that durable color and rubbing varnishes require a long time for air drying and if forced drying is resorted to there is considerable danger of injuring the color.

Nitro Cellulose Finish Is Durable

Under these circumstances a material which would dry quickly in the air, which can be rubbed to a smooth finish easily and which is highly durable has been sought and obtained in the form of certain cellulose nitrate substances. Such materials dry in a remarkably short time by evaporation of the solvent instead of by chemical change of the materials left after evaporation, as is the case with varnishes. They leave a film which is hard as well as tough and durable.

When first employed in production these cellulose nitrate materials were used over surfacing coats in place of color and rubbing varnishes, and the luster was produced by a final coat of finishing varnish. This system still is in use, but its durability is limited by the comparatively low durability of the finishing varnish. It has since been found that sufficient luster can be produced by rubbing and polishing. Moreover, the "durability of the unprotected cellulose nitrate material is many times greater than that of the most durable finishing varnish," and one larger production plant now uses this material, polished by rubbing, as the finishing coat.

Good finishing varnishes will last a long time over durable undercoats, but unless these undercoats possess the proper elasticity the finishing varnish is likely to fail quickly once it starts to crack. A very hard film of baked enamel has proven to be a good surface over which to test finishing varnish to determine the time of exposure required to produce cracking, but once the cracking occurs the varnish may peel very soon. Such peeling does not occur, however, if the coat below the finishing varnish is sufficiently elastic as well as durable.

Another system of finishing which has proved to be quite long lived involves the use of the usual primer and surfacer coats and over them two coats of a grade of color varnish which is even more durable than high-grade finishing varnish. No rubbing and no finishing varnish is employed in this case, but the luster is not high and in some cases is dulled further by addition of material intended to destroy even such luster as otherwise would be secured. This finish is advertised as being both more desirable and more durable than high luster finishes.

Other New Finishes Being Developed

Improvement in durability obtained by cellulose nitrate finishes has stimulated the paint and varnish industry, which now is developing several new finishes.

Black enamel finishes have proved exceptionally durable, but similar finishes in colors only recently have been developed. Since the durability of varnishes of high oil content is much improved by baking, the new system of finishing in color enamels, applied and baked on much the same schedules as black enamels, is considered highly promising.

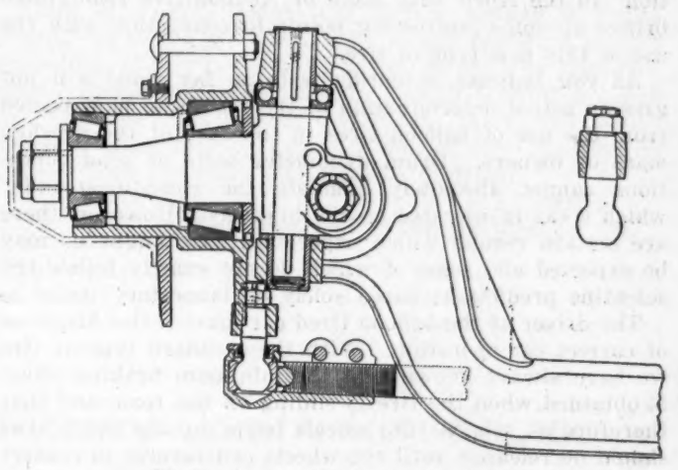
To avoid the ill effects of high baking on the wood used in body construction, one concern is using panels which are finished and baked before they are applied to the body. Others are attempting to solve the problem by the use of fabric leather in place of metal.

Success attendant upon the use of cellulose nitrate finishes has stimulated the development of other materials somewhat outside the paint and varnish field. These include phenolic-condensation products which, though not yet in commercial production, have given some remarkable results. Finishes made of rubber composition similar to that used in the manufacture of artificial leather, such as has proved quite durable for top material, are being developed also by several large companies.

These new developments in the finishing of cars are attributable to a public demand for more durable finishes and the results thus far obtained have resulted from cooperation between makers of finishing materials and automobile manufacturers. It is believed that work already done and now in progress will result materially in lengthened life of automobile finishes.

Shuler Makes New Axle for Double-Deck Buses

A NEW front axle, designed for an Eastern bus manufacturer who is producing a double-deck vehicle with a maximum front load of 9500 lb., is now in production by the Shuler Axle Co. of Louisville, Ky. While it is similar is most respects to other Shuler axles, it differs in some important details. It is, of course, of heavier



Shuler front axle for motor buses

construction all the way through, to take care of the greater load.

One of the features of the new axle is the small distance from the center point of contact of the tire on the road to the axis of the steering knuckle pin produced, in spite of the fact that the steering knuckle pin is vertical. As will be noted from the sectional drawing herewith, this has been largely accomplished by reducing the distance between the axis of the steering knuckle pin and the center plane of the front wheel at the axis. Another feature of the axle is the specially designed ball and socket tierod, which has some novel points, including the taper pin arrangement for taking up wear, replacing the spring usually employed. Although a ball joint is used, the length of the rod can be adjusted by means of a thread on it, in the same manner as with the conventional yoke and pin type. This thread is securely clamped by two clamp bolts. Danger of the rod falling off the ball is eliminated by a safety nut, which is also clamped in place by the same two clamp bolts.

The axle is laid out for fore and aft steer, with the tierod in front of the axle. It can be furnished, however, with the tierod in the rear. At present this axle is manufactured only in one track width, 72 in. The overall width is 88½ in.

Balloon Tires Necessitate Slight Changes in Driving

Easing on the brakes makes it possible to stop in a shorter distance than locking the wheels with low pressure tires. Give snow-shoe effect in sand and tend to prevent stalling.

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial entitled "Balloon Tires and Better Traction" in the April 10th issue of AUTOMOTIVE INDUSTRIES brings up some interesting points in connection with the use of this new type of tire.

As you indicate, scientific tests so far made will not give an actual determination of the results to be expected from the use of balloon tires in the case of the average mass of owners. Drum dynometer tests of road conditions cannot absolutely simulate the conditions under which a car is operated on the highway. However, there are certain results which experience has taught us may be expected and some of which do not exactly follow the scientific predictions based solely on laboratory tests.

The driver of the balloon tired car must revise his ideas of correct car operation. With the standard type of tire we have always known that the minimum braking effect is obtained when the tire is sliding on the road, and that therefore as soon as the wheels begin to slip the brakes should be released until the wheels can revolve in contact with the highway service. This is because of the well-known fact that the friction of sliding on a wet pavement is less than the friction existing when slipping is *impending.*

Stopping Ability Based on Total Friction

You correctly state in the editorial in question that the stopping ability of tires is theoretically based on the total friction and that, if the coefficient of friction is the same, this total amount of friction depends entirely upon the weight carried by the surfaces in contact with the road. This total weight is no greater in the case of the balloon tire with a large area of contact than is the concentrated load of the high pressure type of tire with its reduced area.

The squeegee effect to which you refer, however, does play an important part, with the result that, while balloon tires may start to slide on wet pavement as easily as standard tires, they will not slide so far before the car is brought to a stop. In other words, the coefficient of friction of the large area of the low pressure balloon tire is greater than that of the high pressure tire. It is quite probable that the forward portion of this large area of the tire in contact with the road wipes dry the roadway, so that the rear half slides on pavement having a much higher coefficient of friction. Consequently, the operator of a balloon tire equipped car can apply his brakes so hard as intentionally to start the wheels sliding and will come to a stop quicker than though he operated his car as he has learned from high pressure tire driving conditions.

Another factor in which the actual coefficient of friction does not play so important a part is that of rounding a turn on wet roads at fairly high speeds. The side thrust due to the centrifugal action of the weight of the car reaches the road through a flexible column of air considerably higher than the more rigid column of the standard tire. This flexibility permits a side distortion of the tire with the consequent absorption of the centrifugal thrust before a maximum force is communicated to the tire at the point of contact with the road.

What Will Ice and Snow Do?

The use of balloon tires in winter also introduces some rather peculiar characteristics. The wide area of contact of the balloon tire gives a "snow-shoe" effect when traveling through deep drifts, which under certain conditions may prevent the car from becoming stalled so easily. It is in this case when chains are the most useful. However, the very snow-shoe effect, valuable under these conditions, will render the balloon tire less effective when negotiating half-frozen, slush-covered roads on which a wheel load concentrated on a narrow tire surface is needed to cut through the slush and ice in order to reach the hard pavement of the road and obtain a sufficient "bite." The low load per unit of contact area of the balloon tire makes it ride where the coefficient of friction is lowest with a film of ice, snow or slush between it and the road.

On sheet ice, chains will be found of but little value on the properly *deflated* balloon tire. The very flexibility of the balloon tire "eats up" the chains, for this tire is designed to absorb obstacles considerably greater than the cross links of these chains. Of course, an increased pressure which will cause the balloon tire to ride over the cross links will help to furnish a better grip on an ice-covered road, but no driver will change his air pressure over a short stretch of ice, and extreme care should therefore be used when operating a balloon tire equipped car under these conditions.

Four-wheel brakes have been accepted by the motoring public and the slight change in driving habits required has been absorbed without difficulty. The same will be true of balloon tires, and only a few weeks' use will be

necessary to teach the owner the slight revisions necessary in his theories of car operation under these new conditions.

HAROLD W. SLAUSON,
Engineering Service Manager, Kelly-Springfield Tire Co.

Equalization of Brake Torque Justified

Editor, AUTOMOTIVE INDUSTRIES:

We note in the issue of April 3 a paper by F. A. Stepney Acres on four-wheel brake design which includes statements, in the last two paragraphs under sub-heading "Vertical Knuckle Pivot Preferred" on page 775, which we take issue with. We have found that balancing the brake torque is not only well worth the complication but absolutely necessary for safe and reliable brake operation.

We are aware that efforts have been made in several instances to accomplish a balance of brake forces, but in every case results have been unsatisfactory due to a failure to thoroughly work out every detail to meet the various conditions under which the brakes are required to operate.

Some have failed to realize that cars must be stopped in backing as well as in going ahead, some have been faulty in design involving unnecessary weight or complication or both, and others have failed to provide for possible accidents to the mechanism which might produce disastrous results.

As to the desirability of such an equalizing device, we fail to see any consistency in the attitude that equalization of brake torque is unnecessary so long as a differential for distributing the driving torque is used. The only difference between acceleration and retardation is in the plus and minus signs. Moreover, the mechanism outlined by Mr. Acres is superior in its operation to that of a differential, as it can be designed to prevent serious loss of braking power when the tractive power of one wheel drops to practically zero; whereas with one wheel in soft mud the differential permits the useless waste of power by spinning this wheel around.

This mechanism when properly applied also exerts a directive action on the car as shown by the fact that the driver can release the steering wheel when applying his brakes with no disastrous results. We doubt if any driver would care to do this with any type of brake system now in use when applying his brakes at a speed of 25 or 30 m.p.h. on a wet street. Such a mechanism changes the operation of adjusting brakes from the trial and error method, which is never exact, to one of absolute certainty, as the mechanic can see with his eyes when proper adjustment is obtained.

If such a mechanism is "quite unnecessary and not worth the complication," why is the motoring public so fearful of the word "skidding" and why do they apply their brakes in fear and trembling that they may thereby start a skid when on a wet pavement? If some of the terror is to be taken out of the word skidding, it would appear well to seriously consider a balance of torque and abandon the much overworked and useless method of pressure equalization which does what it is supposed to do about once in a thousand times, and then only by chance.

Since Mr. Acres states that such a method is "quite sound," by which we suppose he means based on correct principles, if this is the case we fail to see why improved results should not be obtained by its use, since it is based on principles diametrically opposite to those upon which pressure equalizers operate. If one of two opposites is correct, then the other one must be incorrect.

G. L. SMITH,
Engineer, United States Ordnance Co.

National Characteristics Affect Internal Combustion Engines

THE development of an industry by any nation depends to a large extent upon national characteristics, and it is interesting to read what Aime Witz, a French scientist, has to say on the influence of the American national character on the development of the internal combustion engine industry in this country (in his work Moteurs a Gaz, a Essence et a Petrole). M. Witz is one of the pioneers of the gas engine industry and his conclusions evidently are based on the history of stationary rather than on that of automotive engines.

"The manufacturer of that new country is excessively practical and the operator whom he entrusts with his machines is no less so. The former attaches little importance to a slight reduction in the consumption of natural gas, kerosene or gasoline, or even of coal; engrossed in his business, he does not want to be bothered either by the machine or by the man who runs it. The latter, who is anybody around the place and whose cooperation must be secured, is even much less interested in any reduction in fuel consumption, which would not benefit him, and desires nothing so much as to have little work to do and the least possible responsibility. He looks with disfavor on polished parts, as he would have to do the polishing.

"Hence, look at the American gas engine! It is above all simple and robust. Nothing is finished, nothing machined, nothing polished except what needs to be. Paint is used to cover the parts that remain otherwise unfinished. No attempt is made to work at very high compression, which leads to increased fuel economy, but subjects the engine to extra stresses, results in pre-ignition and calls for careful attention to the mixture. Lubrication must be automatic. Money is scarce there, at least in times of crises. The customer, therefore, looks to the purchase price and accepts the highest speeds. The engine will wear out quicker but it is written off more rapidly.

"Under these conditions it was only natural that an American type of design should be developed. This has now been accomplished and one of the last pre-war compilations made it known that thirty-seven firms had manufactured 400,000 engines of an aggregate output of more than 3,000,000 hp."

This last statement plainly shows that the conclusions arrived at by M. Witz are based on observations regarding the stationary engine industry in this country.

The work under review is a fifth edition and is published by Albin Michel of Paris. It is an encyclopedic work, comprising two large volumes of about 1250 pages.

Automobile and aircraft engines are dealt with in Chapter XVII of the second volume, the treatment being largely descriptive. There are chapters on carbureters, on gas generators, on Diesel and semi-Diesel engines and on the explosion turbine.

Business Conditions, Not Engineering, Retard Tractor Growth

"I am a rank pessimist for today and also for tomorrow, but a glorious optimist for day after tomorrow," says Cyrus H. McCormick, Jr., at S. A. E. meeting.

THE economic situation and not the tractor itself is to blame for lack of prosperity in the farm tractor business, according to speakers at the Annual Tractor Meeting of the Society of Automotive Engineers held in Chicago, April 24. Cyrus McCormick, Jr., of the International Harvester Co., voiced the sentiments of a majority of the tractor experts present when he said, regarding the farm tractor business, that he is "a rank pessimist for today and also for tomorrow, but a glorious optimist for day after tomorrow." He, as well as others, pointed out that the productive capacity of the American farm today is greater than the food needs of the American people. The export situation is not healthy and so it is but natural that there is no great desire on the part of the farmer to greatly increase his output, even if he had the money for better and more efficient tractors and implements.

On the other hand, there is an ever-growing demand for the tractor in the commercial and industrial fields. New uses for the tractor are opening up in many places. George D. Babcock of the Holt Co. stated that his company has developed the caterpillar tractors for other than farm purposes to such an extent that at the present time only 2 per cent of the Holt output finds its way into the hands of the farmer.

Tractor Anticipates Future Needs

From an engineering standpoint the farm tractor has progressed amazingly. This is particularly true of the general-purpose machine. O. B. Zimmerman of the International Harvester Co., in his paper pointed out the advances in tractor engineering as applied to the farm during the past few years. He showed the parallel development of the farm implements and clearly illustrated the point that the farmer, if he could use it, has available apparatus today which puts power forming on a plane far above what was thought possible a few years ago. His talk showed what the farm business will be when the economic balance is again struck between urban and country labor and intensive farming will again have become a necessity.

The three speakers mentioned comprised the program of the tractor meeting. Col. George D. Babcock of the Holt Co. discussed "Industrial and Commercial Applications of the Tractor." Cyrus McCormick, Jr., of the International Harvester Co., spoke of the "Commercial Importance of Engineering," and O. B. Zimmerman, also of the International Harvester Co., talked about the "General Purpose Tractor for the Farm."

Colonel Babcock showed several reels of moving pictures illustrating the uses to which the tractors produced by his organization have been put in the industrial fields, particularly in lumbering. The films showed logging operations in the Northwest, in Louisiana swamps and in the snow of the North woods. Other films illustrated the tractors engaged in snow removal and in road building. Colonel Babcock said in part:

"The Holt company at the close of the war took over the material of the Ordnance Department with the idea of adapting it to commercial use. Many changes had to be made, so that now while some of the tractors have the same outside appearance as during the war, there is hardly a part of them which has not been altered. One of the most important improvements is in the heat treating of the track shoes.

Design Changed to Meet Needs

"The new treated shoes have a much longer life and greater strength. Furthermore, the tractors are designed for production as well as for performance, so that in the factory production and engineering interlock.

"All sorts of severe conditions have to be met by industrial tractors. In a case where 72 per cent grades were encountered it was necessary to put scavenging pumps on the engine. Trailers in some instances have been equipped with caterpillar tread. There are two types of these, one using the caterpillar tread for the whole length of the trailer. The other is a short type used in logging, with a short caterpillar tread. This second type is used just at one end of the log for pullng it out of difficult places.

"A great many of the tractors are being supplied with winch equipment. Many of these have been sold recently for use in India in the British Government logging operations. On tractors in these industrial fields the life of the track has been increased so that even under the most severe circumstances such as those encountered in Southern logging operations, they last for 3000 miles. In the snow, the life is indefinite. In general, and for average conditions, we are aiming for 5000 miles of track life.

Problem to Keep Bearings Seated

"We are using a 23-20 nickel steel track pin against a carbonized hardened sleeve. We find that loose sleeves and loose spacer blocks work best. It is easily possible to push the spacer block into the track by hand, but the pin is a tight fit in the spacer block. We use a track oiler, but oil is bad in sand, making a fine lapping compound. We use grease for muddy work, but when dry grease is bad, as it picks up the abrasive grit. One of the big problems is to keep the bearings sealed.

"The straight track growser is not suitable for use in snow. Several forms have been tried and at last a development has been found which does not allow the snow to pack into it and at the same time gives good tractive effort. The pressure on snow is about 5 lb. per sq. in. of track. This is less than the pressure exerted by a man,

which averages about 7 lb. per sq. in. The shoe for snow which is damp and tends to pack is open, giving a self-cleaning feature."

In the discussion which followed this paper E. B. Clarke of the Clarke Equipment Co. spoke on the necessity for flexibility in the equipment intended for moving materials. He said that tractors of this kind must contribute directly to the profits of the customer by making it cheaper for him to perform his work. Mr. Clarke believes that a tractor must be designed especially for the job or purpose on which it is to work if it is to function properly. A unit assembled from standard parts cannot fulfil all of the necessary requirements.

The Case Against the Horse

Chairman Eason, commenting on the entrance of the tractor manufacturer into fields other than farming, said that the question of motorized farming is one of food needs. He said that we now can raise more food than we can eat. "We overproduce in wheats and other staples," he went on. "Rents in Chicago are from three to ten times the pre-war level and yet the return to the farmer is but little higher. It takes 2½ acres to feed a man for a year. It takes 5 acres to feed a horse. There are 25,000,000 horses in the country who are taking annually enough food to feed 50,000,000 people, figured on an acreage basis."

Colonel Babcock added that there is a well defined field in agriculture for the caterpillar type of tractor. It can be used for such tasks as cultivation in the orchards, berry growing and cotton raising. Where cultivation up and down and across steep hills is necessary the caterpillar is a necessity. In the wheat fields of the Northwest, where it is necessary to work around the hill pinnacles, the caterpillar type is used successfully.

Cyrus M. McCormick, Jr., drew a picture of the economic situation as it faces the farmer and those who manufacture for him. He said:

"I am a pessimist for today and I am a pessimist for tomorrow, but I am a glorious optimist for day after tomorrow. I do not know when day after tomorrow is coming, whether it really will be day after tomorrow or whether it will be many years from now, but when prosperity comes again it will be prosperity for the farmer as well as for the manufacturer.

What Canadian Tariff Cut Accomplished

"Take Canada as an example. We can look at this impartially because we manufacture in Canada as well as in the United States. On the demand of the farmer the tariff has been cut in half, because the farmer wanted to buy his implements cheaper. He was dissatisfied because he could not buy his implements at the prices paid by his neighbors in Montana or Dakota. The Canadian farmer does himself an injustice. The reduced tariff lets in the quantity of manufactured goods at competitive prices, throws the Canadian laboring man out of work, and the result is that the farmer has no market to sell to and it is harder for him to buy the implements at the lower prices than it was at the higher. The people to whom he was selling either have no money to buy or else have gone where they can get work and he has lost time as customers.

"We must look at a question from all sides to get the truth. Just a little less than 50 per cent of our population is made up of the rural population. That is, people in small towns and on the farms. The people in the small towns are very often farm owners who have leased their farms, so that of the rural population 50 per cent are tenant farmers and business men. These people are not prosperous. We point to the large sales of Sears Roebuck and Montgomery Ward in 1923, but we find that their sales are less for 1924. Two hundred thousand families have moved away from the farm and more will move until the economic balance again is struck. Then there will be just enough people to produce the food for the balance of the population and the farmer will again become prosperous and labor will come down.

"At the present time the labor content in the price of manufactured goods is too high. In our business 80 per cent of the cost is in labor. This does not mean that the direct labor cost is 80 per cent, but if we take coal we find that the labor content for mining and transporting is abnormally high. In steel the labor content is 76 per cent. We must reduce this so as to bring the cost of the product down where the farmer can buy it.

"The purpose of commercial engineering is to refine the product. It must not only be made better but made cheaper. We must give the farmer something that he can afford to buy and that will return him efficient service. The increase in the farm population from 1910 to 1920 was 4 per cent. Yet the increase in the amount produced was 41 per cent. This shows that the farmer has become more efficient."

Traces History of Tractors

O. B. Zimmerman traced the progress of the general purpose tractor for the farm from its beginning 30 years ago to its present developed state. He showed a number of reels of film illustrating modern power farming on a large scale. He said in part:

"The general purpose tractor started 30 years ago with steam for power. It provided portable belt power but could only just propel itself and had to be accompanied by an engineer, road wagon and a large supply of equipment. Twenty years ago we had the first unit which supplied a combined tractor for plowing and belt power. The demand for lighter equipment caused the 40,000 lb. steam tractor to give way to the 30,000 lb. gas tractor. The development was a battle between the slow heavy types and the lighter and faster machines.

"Tractor service developed out of the field experts who helped the farmer to get his apparatus to work on a paying basis. The stunt performances such as moving houses, pulling trees, etc., gave the tractor publicity and did much to educate the farmer. The winter tractor schools also were a great help. Then came a parallel development in implements. The horse plow, mower, binder, etc., were not suitable. The implements for the tractor had to be developed. Then came the power take-off. Today the tractor is light, efficient and capable with the implements which have been developed to perform tasks about the farm that were thought to be impossible for anything but manual labor.

What They Have Contributed

"The contributions of the tractor industry to the automotive field are many. Among the developments in which the tractor industry leads are: Kerosene as a fuel, the impulse starter, oil in the cooling system for anti-freeze, exhaust induced cooling, the development of the thermo-syphon system, air cleaners, removable sleeve engines, accessibility and large and dependable dimensions.

"The general purpose tractor serves an important field in the economic development of the country. The seasonal and variable demands which it must meet necessitate careful engineering, but with the millions spent to put it on its present plane it is the economic situation alone which holds back this industry."

THE customs rates of Finland for 1924 imposes an *ad valorem* import duty of 20 per cent on private motor cars and of 10 per cent on commercial motor vehicles.

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Automotive Legislation

THE booming of favorite sons incidental to a Presidential year and political scandals in Washington have obscured to some extent the fact that State Legislatures have continued the process of grinding out automotive legislation. While relatively few State assemblies have been in session during the past winter, those at work have been giving considerable attention to the automobile. Taken by and large the results have been favorable to constructive automotive development.

Compulsory insurance bills were brought up and discussed in several States, but up to the present time none has become law. The interest evinced in this type of legislation, however, indicates that it will be a very live topic next winter, when more than forty State Legislatures go into session. Thus far the automotive industry has not taken any definite stand on this particular proposal, but serious thought should be given to it in the next ten months, as it is almost certain to come up for consideration in various parts of the country.

Motor vehicle taxes have been raised slightly in some States, but the exact extent of the increase cannot yet be determined. The chief interest in automotive legislative developments of the last few months lies in the fact that they indicate the probable trend of events when a large number of Legislatures meet next year.

Dealers Must Make Profits

REPORTS coming from various sections of the country tell of arbitrary methods adopted by certain factories to force cars on dealers. These stories probably are greatly exaggerated in a good many cases, but there undoubtedly is some basis for them. Manufacturers can't keep up production by such tactics, but they can demoralize their retail sales organizations.

Automobile dealers who don't sell a reasonable number of cars in their territories should be displaced, but before such drastic action is taken there should be an intelligent determination of what a "reasonable" number is. If a dealer sold 100 in a certain period last year it is quite possible he might be doing a much better job of salesmanship by getting rid of 50 in the corresponding period this year. He is not responsible for the economic conditions which prevail in the field he has to cultivate.

Sales almost everywhere this spring have fallen considerably short of the mark set in 1923, but it is becoming apparent that 1923 was an abnormal year. If producers over-estimated the probable demand and built too many cars the fault does not lie with their retailers and they should not be made to bear the burden. Manufacturers naturally are eager to release the capital tied up in finished products, but they should employ constructive rather than destructive methods in doing so.

Most dealers have plenty of trouble on their hands in getting rid of the stocks they already have and when they are harassed by additional shipments which they don't want they are entirely justified in refusing to take them. They are in business primarily to make money for themselves, a fact which some factory sales managers seem to have great difficulty in comprehending.

When dealers are pressed constantly to take more cars they resort, in desperation, to all sorts of expedients to make sales. The two most menacing are ruinous trading allowances and unsound credit terms. This is a combination which will ruin any dealer and reports are filtering in of an increasing dealer mortality. They are not in as strong a position relatively as the manufacturers, because the profits of the rank and file have been meager in the last two years when factories have been running at top speed.

Future success or failure of automobile producers will be found in the realm of merchandising. Success cannot be won by forcing dealer organizations upon the rocks. They can move their goods only if they have an efficient, well-knit, profit-making retail sales organization.

Sales unquestionably should be forced at this time to get rid of the surplus of finished products on hand, but they should be forced intelligently in those sections where intensive methods are most likely to bring results. Last year's methods and quotas mean mighty little now. Sales departments should be seeking out the districts where sales resistance is least strong and concentrating their efforts there.

Relations with dealers at a time when sales are slipping should be cordial and cooperative rather than arbitrary and selfish. The statement has been made many times that no manufacturer can succeed unless his dealers are happy and prosperous, but acceptance of this principle merely as an academic theory is not sufficient. It must be put into practice before it can bring results.

Throwing the Spotlight on Facts

ONE of the gratifying developments of the past two years in the automotive industry has been the increased freedom and frankness with which it has discussed its affairs. Production figures are not guarded as zealously as they once were, especially by the larger makers. Those which are made public are accurate and they inspire confidence, although there still is too strong a tendency on the part of the smaller concerns to attempt through publicity departments to give the impression that they are making many more cars than they really are.

Another innovation is the publication of quarterly financial statements, as well as the annual reports which heretofore have been held to contain all the information to which the public was entitled. One of the most pleasing recent announcements in this respect is that the General Motors Corp. will issue statements of its earnings every three months hereafter. As the biggest single factor in the industry next to Ford, this information will have a definite value for the entire industry as well as for the public, because it will show graphically the trend of trade.

The manufacture of motor cars has ceased to be a highy speculative, seasonal business. It has reached a degree of stabilization it never before attained and it has nothing to hide from rivals, bankers or investors.

Margins of Profit

COINCIDENTALLY with the publication of the annual financial statement of the Ford Motor Co., filed with the Massachusetts Commissioner of Corporations, the industry is beginning to wonder whether the striking decrease in profits as compared with the preceding year is the result of a much lower margin per unit or whether it has been absorbed in new machinery. The decrease in earnings and the increase in value of machinery are almost identical.

The earnings of the company, which is virtually synonymous with Henry Ford, approximated $82,000,000 for the year ended Feb. 29, last, as compared with $119,000,000 in the previous fiscal year. This was a drop of $37,000,000, or 31 per cent, in the face of an increase of 600,000, or 42 per cent, in the production of cars and trucks in the same period.

Mr. Ford does not go into great detail in the analysis of his business and leaves much to the imagination, so there is no way of determining exactly the sources of his profits or how they were divided, although a large percentage came from the sale of parts. If it could be assumed arbitrarily, however, that passenger cars and trucks were his only sources of revenue, his profit per vehicle on the 1,400,000 he made in the twelve months from March 1, 1922, to March 1, 1923, was $85, while the profit per vehicle on the 2,000,000 turned out from March 1, 1923, to March 1, 1924, was only $41.

But it is not logical to assume that Mr. Ford sacrificed more than half his margin of profit per unit in order to increase his output by considerably less than 50 per cent. A more reasonable explanation of the shrinkage in returns is that he reinvested an unusual amount in equipment and there is evidence that this was exactly what he did for the last statement of assets shows "machinery" valued at $87,689,000 compared with only $54,743,000 in the preceding year. This would account for all but $4,000,000 of the loss and that could easily have been absorbed in the merchandise account which increased from $83,693,000 to $94,328,000.

On the whole, there is little reason to believe that the margin of profit per unit is much smaller now than it was a year ago when production was smaller.

The publicity which attended the Ford announcement a year ago that he had on hand $159,000,000 in cash apparently was somewhat distasteful to him because that information is included this year under the statement that "cash, securities, trade marks, accounts receivable, etc.," aggregated $271,000,000. Assuming that the other items in this category were virtually the same as they were a year ago, his cash balance would be only about $141,000,000, but this is purely hypothetical. In any event he could pay all his obligations and retire all his capital stock out of his cash reserves and still have $15,000,000 left with his vast property holdings entirely unencumbered.

Our Hesitant Buyers

MANUFACTURERS in the automobile field who believe, or at least profess to believe, that the volume of spring buying has been disappointing up to this time chiefly because of unfavorable weather conditions, may find food for thought in this statement made in Bradstreet's summary of "the state of trade" for the week ending April 24:

"The long continued cautious buying at wholesale seems to be finding its counterpart in retail trade, which hitherto has been esteemed to have been quiet because of weather and seasonal conditions."

Financial caution has been chiefly responsible for hesitancy in automobile buying.

VARIOUS CONDITIONS GOVERN SALES

Denver

DENVER, April 29—Both new and used car sales seem to average at least a shade better than the first four months of last year, with April gaining substantially and healthy prospects in view for the next three months.

Bad March weather was a serious handicap with some dealers, coupled with buyers' reluctance to accept market loss on cars bought at the peak three years ago. Conservative dealers blame the slow market partly to radical equipment changes not yet proved enough to settle the public's mind as to their practicability.

Low priced cars are showing a 30 per cent gain, with medium and high priced lines ranging from worse than half loss to third gain and some gaining better in wholesale than retail. Oil developments are helping both sales and outlook in Colorado and Wyoming, with special industries and highway improvements helping further.

While conservative dealers admit disappointment they are not pessimistic, and many now behind last year predict making up on either new or used cars. The latter are moving well through the "Green Seal" sales plan.

Hartford

HARTFORD, CONN., April 29—Sales for the first quarter represent an increase of from 10 to 15 per cent. April business promised well, but has slowed down, which is attributed largely to the weather. Practically all dealers can make either immediate or reasonably prompt delivery. Some are overstocked to such an extent as to feel apprehensive.

It is expected that business will be fairly good until July. There is an undercurrent of conservatism. Tightening of credit is reported. The anticipated seasonal increase in sales has not materialized. Used car stocks in many cases are heavy and the market is slow. A week of good weather would materially change the situation. A good year is anticipated.

PRESIDENTIAL YEAR IS AFFECTING SALES

MINNEAPOLIS, April 29—As a whole automobile sales in this district are 15 to 20 per cent behind last year. The agricultural situation has much to do with the drop, while in some districts it is hard to get money or credit to handle sales. Presidential year and uncertainty as to action by Congress on important legislation are also among the causes.

Also the late spring and delay of three weeks in farm operations has something to do with the situation. Sales conditions are not improving yet, although some dealers expect the usual April spurt to come in May. Dealers are not unusually overstocked, particularly where distributors have not allowed dealers to buy beyond capacity to handle.

The decline in sales this year is expected to range from 20 to 50 per cent, depending much on make and price of car and sales methods of dealers. The medium priced car has the edge. The used car market continues good where prices are right.

New York

NEW YORK, April 29—It appears that April will come to a close with passenger car sales in the New York territory a little ahead of the first four months of 1923.

New car registration figures for ten counties in and around the metropolis were 19,448 from Jan. 1 to April 8, as compared with 18,300 for the same three months and one week of 1923. Figures for the rest of April are not yet available, but the indications are that they will slightly exceed those of last year.

These figures apply to car units. Sales in dollars probably will be about even with last year, owing to the fact that a large percentage of this year's increase in unit sales is in low priced cars.

Stocks in dealers' hands are not excessive, except in comparatively few lines which produced heavily and shipped heavily to dealers the first three months of the year. Used car stocks are believed to be not quite as heavy as they were a year ago, owing to greater caution on the part of dealers in trading.

Despite the fact that sales for the first third of the year will be a little better than last year, the April business has been disappointing because expectations of the trade were high. It is not easy to determine the elements which have slowed up sales, but apparently rainy weather, unsettled stock market conditions and some business hesitation resulting from the political situation in Washington have had something to do with the retarded buying interest.

Distributors and branch managers generally expect that sales will run fairly even with last year for the first six months.

(*Conditions in other cities on next page*)

Quarter's Sales Near Record But Behind Expectations

(*Continued from page* 955)

says, in explanation of a sales drop of 20 per cent as compared with last year:

"The agricultural situation has had much to do with the drop. Other causes are the fact that it is a Presidential year and uncertainty concerning the action by Congress on important legislation. The late spring and a delay of three weeks in farm operations are contributing factors. Because of these conditions there are many districts in which it is difficult to get money or credit to finance sales."

Weather conditions are given as one of the causes of decreased sales in Columbus, but "a majority of distributors and dealers believe there are other potent causes, such as unsettled business conditions and growing unemployment."

Causes of decreased sales in Cincinnati are "unfavorable weather and the reduced buying power of many persons because of the poor industrial situation in the machine tool and other industries."

Rochester dealers attribute a falling off in business to a return to normalcy after a period of abnormal buying.

The trade in Toledo believes the sales decline due to unsettled political conditions which have resulted in a general tendency to await price reductions and other conditions which might be favorable to buyers.

Atlanta also reports that the public is expecting lower prices soon.

The most novel reason advanced for sales resistance comes from Denver, where conservative dealers assert it is due in part to "radical equipment changes not yet proven enough to settle the public's mind as to their practicability."

Notwithstanding all the difficulties which confront them, however, the rank and file of dealers are not discouraged over the outlook and their optimism is a distinct tribute to their courage. They don't expect their sales this year to be any larger than they were in 1923, but they are going to strive manfully to keep the volume as large as possible.

BAD WEATHER IS PARTLY TO BLAME

Baltimore

BALTIMORE, April 29—Baltimore dealers in passenger cars are decidedly optimistic in regard to the business for this year. Although some of them have been hampered somewhat during the first three months of 1924 most of them are inclined to blame weather conditions almost entirely, with one here and there holding that the political situation also is being felt. They regard the outlook as bright, however.

Few dealers have done less business so far this year than during the corresponding period of 1923. Most of them have done better, in some cases the increases being large. Others report that January and February of this year were much better than the same months of last year, but there was a marked decrease in the March business, the totals for the three months being about equal.

Stocks are in good shape. Dealers do not believe they have too many new cars in stock. In some cases their stocks might be called rather heavy, but it could not be said that they are overstocked. The lull in business during March in some lines left more cars on hand than some of the dealers had expected, however.

Kansas City

KANSAS CITY, April 29—Passenger car sales are 20 to 50 per cent behind last year at this time. In each line except the low priced there are some dealers who are only slightly behind last year, but they are few, and special conditions seem responsible for their maintenance of volume. Weather is still being largely blamed for the situation, not only because it has directly handicapped car sales, but because it has affected all other merchandise lines.

But weather cannot carry all the blame. Some is due to hesitancy of the public to spend money. Many prospects known to be able to buy have kept putting off the salesmen from month to month. Retail sales in the rural districts are expected to improve next month, when the fine crop prospects are still further verified.

But country bankers intimate that farmers will need all crop money for debts. More dealers are acting conservatively in taking used cars, and a larger number than last year have small used car inventories, even though they have sold few new cars.

Chicago

CHICAGO, April 29—The general run of talk in local automobile circles is to the effect that the great majority of dealers in the Chicago trade are running much behind earlier expectations and last year's totals at this time.

If the great majority are running much behind, only a small percentage of those in this predicament are willing to admit it. In fact, more than half the dealers insist they are running even with last year at this time or ahead, some declaring they are ahead as much as 20 per cent. Some of them doubtless are running comfortably ahead. On the other hand, some are known to be lagging and admit it, the admitted slumps ranging from a slight margin to 50 per cent.

All, with isolated exceptions, are well stocked or overstocked on new cars, but used car stocks are comparatively low. The percentage of straight sales without trade-ins has been running high. What Chicago dealers think of the outlook for the year on the whole is another thing that varies, but the general tone of the trade is more than 50 per cent optimistic. Most of the trade confidently expect conditions to right themselves and blame backwardness upon weather conditions.

Charlotte

CHARLOTTE, N. C., April 29—The last few weeks have witnessed a slight slowing down in automobile sales. The decline is not heavy, perhaps not more than was expected after the heavy business through the fall and winter. The buyers seem to have reversed the usual order, for this season at least, of buying in the winter months rather than the spring. This apparent reversal, however, is the natural result of conditions, dealers say.

Up to the beginning of last fall there had been a slack buying period. Then people who had been making the old car do, and non-car owners who had been waiting for good business in their own lines, entered the market. With many dealers cars were taken as fast as they could get them in and, in this section at least, business thrived. This business extended to the farmers, who had been largely out of the market for several years.

This accumulated demand was to a large extent satisfied during the fall and winter, and the business now is simply getting back to the normal demand. The decrease from the business of the last few months is not regarded as a serious setback nor indicative of any serious disturbance to business conditions generally.

Salt Lake City

SALT LAKE CITY, April 29—It is impossible to make any statement regarding the automobile business here that would apply to every dealer. Some are badly overstocked, others are in good shape. The sales of some show a big gain, others are falling behind.

Taking the city as a whole, the automobile business would not seem to be in really first class shape.

Toledo

TOLEDO, April 29—Toledo dealers believe they are in a buyers' market in passenger cars at the present time, with sales improving considerably in the last few weeks, but with an outlook that will not place 1924 sales quite up to the mark set last year.

There were 1758 new cars marketed here in the first quarter of the year, as compared with 1985 for the same period in 1923. This is a drop of 11.4 per cent. February, however, was the worst month, due to bad weather and lack of sales impetus as shows. March was only 5 per cent behind last year, indicating a tendency to pick up with better weather.

Some of the lower priced cars were ahead of last year sales and so were a few individual high priced lines. The medium priced cars maintained about the average of 17 per cent below last spring.

Dealers believe unsettled political conditions have brought about a general tendency to wait price reductions and other conditions which might be favorable to buyers. They think the huge first quarter production has had the same tendency to create a buyers' market.

The used car situation here is excellent, with only about 23 cars to a dealer on the average and sales fair. Dealers do not feel overstocked, although all have larger stocks than ever before.

Los Angeles

LOS ANGELES, April 29—The passenger car sale situation in southern California is very unsettled. The outbreak of the hoof and mouth disease has been followed by establishment of quarantines against California products by surrounding States and all classes of marketing and merchandising are beginning to feel the effects. Train loads of fruit are standing on sidings, the railroads not being permitted to move them.

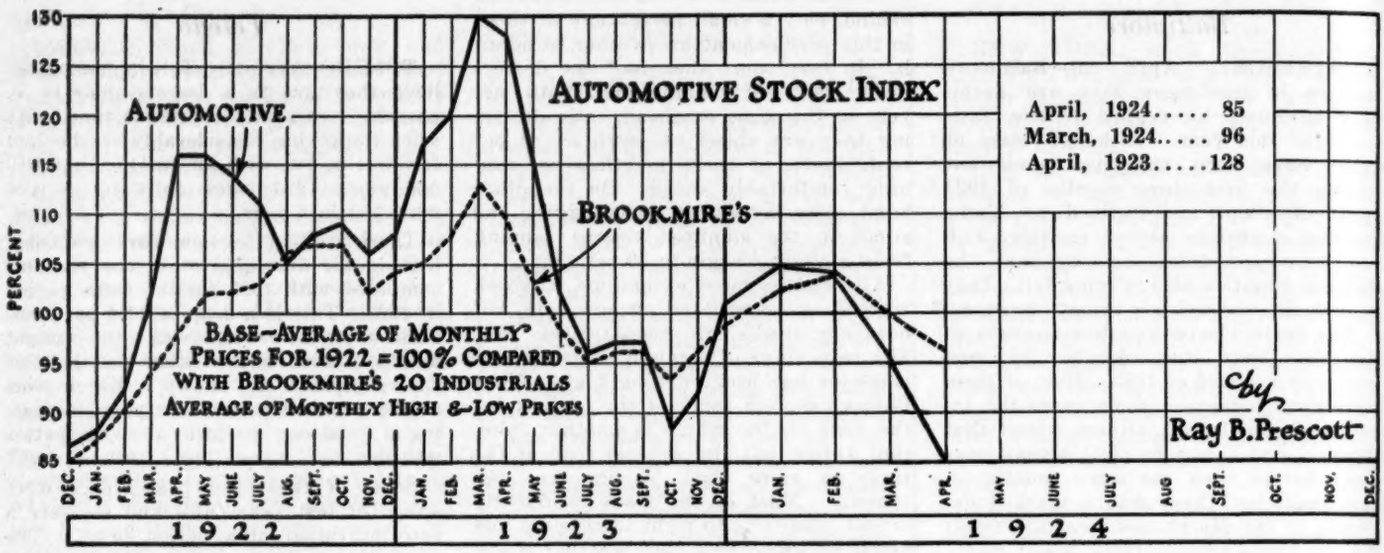
Banking interests, anticipating the probable need for loans to agricultural interests as a result of this situation, are tightening on their loans on automotive paper. If quarantines remain in effect indefinitely a further depression in automobile buying is certain to result.

Loss in March was 20 per cent, as compared with the same month in 1923, and the loss for the quarter is almost 8 per cent.

There are heavy overstocks on some makes of new cars and the supply of used cars is so heavy that trade-in appraisals have been pared to the bone. Dealers say they are not apprehensive over the quantity of cars on hand providing factories withhold additional shipments pending better conditions.

(*Conditions in other cities on page* 991)

FURTHER DROP IN AUTOMOTIVE STOCKS



New York Exchange

	Mar. 4	Apr. 1	Apr. 28
Ajax Rubber	8	6¾	6
American Bosch	34	26½	24¾
American-La France	11	10½	10¾
American-La France pfd.	95	..	96
Case, J. I.	24	..	⅝
Case, J. I. pfd.	67	49	..
Chandler	59¾	48⅞	47
Continental Motors	7	6⅞	6½
Eaton Axle & Spring	62	17	17½
Electric Storage Battery	62	57	57
Emerson-Brantingham	1¾	1½	..
Emerson-Brantingham pfd.	8	10	..
Fisher Body	205½	205½	209
Fisher Body pfd.	99½	99	99½
Fisk Tire	8¼	7¼	6½
Fisk Tire pfd.	..	54½	47½
Gardner	4⅞	..	5
General Motors	143¾	141¼	14
General Motors pfd.	82	..	83
General Motors 6%	81¾	81¾	83
General Motors 7%	99⅛	95	97½
Goodrich, B. F.	21⅞	20¼	20½
Goodrich, B. F. pfd.	76	71¼	72
Goodyear Tire pfd.	41¾	43⅛	42⅝
Goodyear Tire pf. pfd.	92⅜	90	91½
Gray & Davis	6½	5¼	4¾
Hudson Motor Co.	26½	26¼	23⅞
Hupp Motor	16	13⅝	12⅞
Indian Motorcycle	20½	19½	20½
International Motorcycle	84¾	83	85
International Harvester pfd.	106½	..	107
Kelly-S Tire	22¼	17	15⅝
Kelly-S Tire 6% pfd.	72½	55	52½
Kelly-S Tire 8% pfd.	66	45¾	51
Kelsey Wheel	100	86	81
Kelsey Wheel pfd.	106	..	..
Keystone Tire	2⅞	2	2
Lee Rubber	12½	11¾	10⅝
Mack Truck	89⅜	81	81
Mack Truck 1st pfd.	98	96¼	..
Mack Truck 2nd pfd.	88¾	88	87
Marlin-Rockwell	11½	12¼	11½
Martin-Perry	33½	35	35½
Maxwell Motors A	51½	43⅝	42¾
Maxwell Motors B	14⅞	11⅞	11¾
Moon Motors	25¼	23⅛	20½
Mullins Body	12	10	..
Mullins pfd.	89	..	..
Nash Motors	109	100¾	100¾
Nash Motors pfd.	100	99¾	99
Ohio Body & Blower	2½	1¾	..
Packard	11⅝	10½	10
Packard pfd.	91	93¼	89½
Parish & Bingham	14¼	14⅞	15¼
Pierce-Arrow	9¾	8⅞	8⅛
Pierce-Arrow pfd.	25	21½	21½
Pierce-Arrow pr. pfd.	68	43¾	..
Reynolds Spring	16½	15	14⅞
Spicer Mfg. Co.	13¾	13	12
Spicer Mfg. Co.	87	85	..
Stewart-Warner	89	77½	73¾
Stromberg Carburetor	78⅝	64½	64
Studebaker	101⅜	93¼	85⅞
Studebaker pfd.	110¼	111	..
Timken Roller Bearing	39	36	34⅞
U. S. Rubber	33⅜	30¼	29⅜
U. S. Rubber 1st pfd.	82½	79½	79

Detroit

	Mar. 4	Apr. 1	Apr. 28
Auto Body Com.	2	..	1¼
Columbia Motors	1/16	½	1/16
C. G. Spring Co.	..	7	5⅛
C. G. Spring Co. pfd.	..	6	6
Continental Motors	7¼	6⅞	6¼
Edmunds & Jones	40	39	34
Edmunds & Jones pfd.	93	92½	..
Federal Truck	21½	22	..
Ford of Canada	448	455	448
Gen. Al. & Brass Mfg. Co.	..	14¼	13¼
Hayes Mfg. Co.	2½	1⅞	1¾
Motor Products	75	65	..
Motor Products pfd.	47	48½	..
Motor Wheel	10	9½	9
Packard com.	11½	10¼	10⅛
Packard pfd.	91½	93¼	..
Paige-Detroit	17¾	15	13⅝
Reo	18	16⅛	17⅛
Timken Axle com.	6⅜	5	5½
Timken -D Axle pfd.	..	..	75

Chicago

	Mar. 4	Apr. 1	Apr. 28
Bassick Alemite	..	32½	30½
Borg & Beck	..	..	24¼
Continental Motors	7⅛	6¾	6½
Earl Motors	..	..	..
Eaton Axle & Spring	23¼	..	..
Gill Mfg. Co.	17	..	..
Hayes Wheel	..	..	..
Hupp	15¾	..	12½
McCord	..	32	..
Reo	..	16⅛	..
Reynolds Spring	..	..	..
Stewart-Warner	89½	77¼	72⅞
Yellow Mfg. Co.	81	81¾	57

Philadelphia

	Mar. 4	Apr. 1	Apr. 28
Electric Storage Battery	..	58	57

Cleveland

	Mar. 4	Apr. 1	Apr. 28
Firestone	70	68	66
Firestone 6%	92½	96	93½
Firestone 7%	89¼	87	86
Goodyear	10¾	10	10
Goodyear pfd.	42	..	43
Jordan pfd.	96½	..	90
Miller Rubber	66	65	61
Miller Rubber pfd.	96½	97	97
Peerless Motors	22	18¼	20
Stearns F. B.	17½	15	14¼

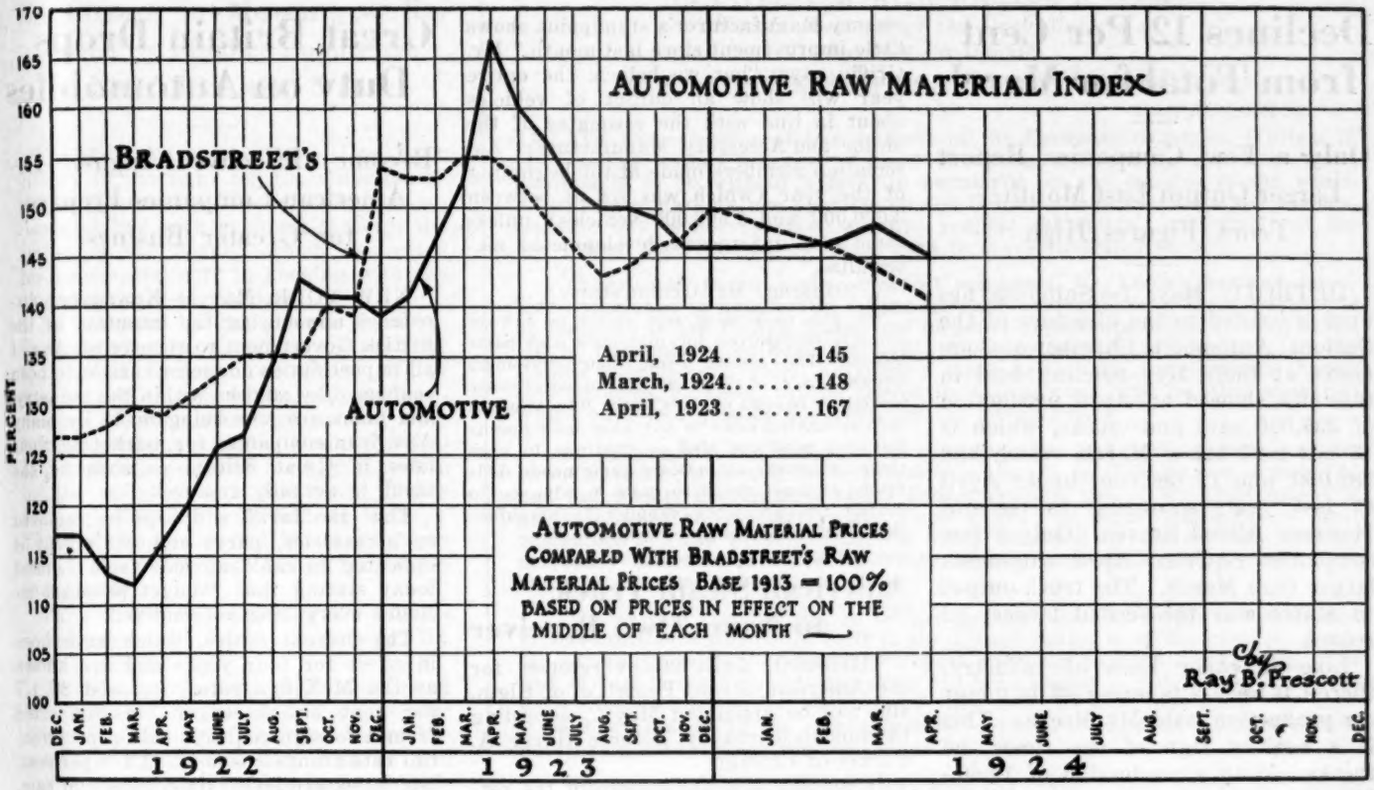
Boston

	Mar. 4	Apr. 1	Apr. 28
Gray & Davis	7	..	4¾
Greenfield Tap & Die	14¾	13¾	14
Hood Rubber	50½	46	..
General Motors	14¾	..	..
Fisk Rubber	58½	..	..

New York Curb

	Mar. 4	Apr. 1	Apr. 28
Bassick Alemite	..	32½	..
Cleveland Motors	20	19¼	18
Durant Motors	27½	20¾	18½
Durant Motors of Ind.	8	..	..
Dupont Motors	..	1	..
Edmunds & Jones	40½	..	..
Ford of Canada	452	456½	454
Goodyear Tire & Rubber	10	10	10
Hudson pfd.	17½	20⅞	26
Jordan Motor Car	31¼	26½	..
Motor Products Corp.	..	..	..
Motor Products pfd.	..	..	47½
Paige-Detroit	18	15½	13¼
Peerless	22½	19	20
Reo	17⅞	16¼	17¼
Stutz Motors	10¾	8	8
Standard Motors	..	2⅞	2½
Timken -D Axle	6⅜	..	5⅝

PRICES OF MATERIALS MOVE DOWNWARD



Sales in Boston Mount Above Those Reported Last Year

Boston

BOSTON, April 29—Motor sales wholesale and retail up to date are above those of a year ago, some of the distributors quoting figures to show that the increase is as high as 40 per cent. On the other hand, they state that compared to what they had anticipated for 1924 the volume of sales is about 25 per cent off.

Some of the dealers in high priced cars already have sold their entire April allotment. In the medium price class the cars are being moved at a consistent rate, but not in any real quantity.

In the lower price class some of the dealers are behind in orders now due to the big rush to get cars after April 1. Because of large deliveries since the first of the month the totals have gone up, but many of the sales were credited to January, February or March. A number of dealers have cars on hand all registered with plates on, payments made, etc., but owners are holding off taking them.

The weather has been too cold, raw and rainy. This has clogged up business somewhat. Some of the dealers believe that warm weather will improve conditions, but not to any extraordinary extent. In the textile centers conditions are bad from strikes and part time work, and this is reflected upon the wholesale orders. Generally speaking, the feeling is that sales will later get down to a slower gait, spread out more evenly, but result in the keenest sort of competition.

Indianapolis

INDIANAPOLIS, April 29—Indiana sales are very little if any below last year's totals to date. The first quarter was 2 per cent better than last year, with April selling apparently better than March, which was 12 per cent under last year's record. Several dealers report improvement after the drop of March, but do not expect this month to equal last year's mark for April, which was top for the year.

Out-in-the-State conditions have been better than those in Indianapolis, but in certain lines and localities are slowing somewhat, due in a few reported quarters to tightening credits in smaller towns.

Dealers' stocks throughout the State are less than during last month, owing to retail deliveries and unwillingness of country dealers to increase stocks beyond demand in actual sight. Used car stocks are still high, but the situation has been eased through special sales. Practically no dealers or distributors expect this year's State totals to equal last year's, unless there is an unexpected late summer and fall sales boom.

Rochester

ROCHESTER, April 29—Sales of high priced passenger cars so far this year show a decided increase over those of last year, but in the medium and low priced lines sales in some cases are falling slightly below. Dealers do not regard this as an ominous sign, considering the fact that last year was an extraordinary one for low and medium priced cars. They regard sales so far this year as more normal, even though they fall below the previous year's record.

All dealers report a great increase in sales resistance. Some think the failure of Congress to devote itself to its legislative duties is responsible for the tightening up of prospects' pocketbooks by creating a feeling of unrest.

The general opinion, however, is that wherever sales have fallen off they have merely returned from an abnormal peak to normalcy. Sales conditions are improving and the year as a whole looks very promising, say the dealers. None of the dealers are overstocked on either new or used cars. The latter are moving very well, according to most of the dealers, although a few report their used car sales not up to last year's record. This they attributed to the weather.

(*Conditions in other cities on pages* 998 *and* 999)

APRIL PRODUCTION PLACED AT 337,000

Declines 12 Per Cent from Total for March

Only a Few Companies Report Larger Output Last Month—Truck Figures High

DETROIT, May. 1—Shipping figures presented to the directors of the National Automobile Chamber of Commerce at their May meeting held in this city showed an April production of 337,000 cars and trucks, which is 12 per cent below March, which had 382,000, and 12 per cent under April of last year, according to General Manager Alfred Reeves. Only a few companies reported April shipments larger than March. The truck output in March was the second largest on record.

Like all other lines of industry, there has been a tapering off in motor car production, said Mr. Reeves. This is a healthy sign of the times, he thinks. With a production of 1,066,000 during the first three months, the real menace would have been any greater increase in the making of cars and trucks, he said.

The survey of retail trade conditions made from reports received from various sections of the country showed that April sales were larger than March, dealers said, but somewhat smaller than April of last year, except in Michigan, New York and Pennsylvania. The agricultural Middle West showed a slight improvement over a year ago in cars selling below $1,500.

New car stocks are larger than in 1923 at this time, with the exceptions of Harrisburg, Detroit, New York, Pittsburgh, Richmond and Indianapolis, where dealers report smaller inventories.

The high-priced car and heavy truck outlook is said not to be up to a year ago, but the less than 2-ton truck prospects are about the same as last year.

Caution in Commitments Urged on Parts Makers

NEW YORK, April 28—Declaring that there is nothing fundamentally wrong with general business of the country as analyzed by the directors of the Motor and Accessory Manufacturers' Association at their monthly meeting last week, President G. Brewer Griffin in a message to members advises caution in placing commitments and tells them to urge their customers to order at least 60 to 90 days in advance of their needs.

"The automotive business from an accessory manufacturer's standpoint shows little improvement since last month," Mr. Griffin says, "but we believe the entire year will show an output of vehicles about in line with the estimates of the Motor and Accessory Manufacturers' Association members made at the beginning of the year (which was set at between 3,000,000 and 3,500,000 vehicles) unless some now unforeseen developments materialize."

Continuing, Mr. Griffin states:

We are cautioning our members not to commit themselves for materials and parts beyond firm orders from their customers where parts of devices are in any sense special, or beyond 60 days' stock in advance of safe estimated sales in any case with manufactured products, and to continue to urge their customers to indicate their needs definitely at least 60 or 90 days in advance to permit the accessory supplier to manufacture with economical certainty.

American Steam Truck to Name Own Receiver

CHICAGO, April 29—A receiver for the American Steam Truck Co. of Elgin, Ill., will be appointed May 7, according to announcement by Referee Harry A. Parkin of Chicago.

In making this announcement the referee stated that he desired to give the company and its creditors ample time to select a receiver, but that if they have not acted by May 7 he will make the appointment himself.

The involuntary bankruptcy proceedings against the steam truck company were instituted April 11. The company was the successor of the Duty Motor Corp.

$350 to $590 Advance in Prices of Premier

INDIANAPOLIS, April 28—Price advances of from $350 on the open models to $590 on the closed jobs are announced by Premier Motors, Inc. Comparison of the old and new prices follows:

	Old Price	New Price
5-pass. phaeton	$2,535	$2,885
7-pass. phaeton	2,585	2,935
Roadster	2,535	2,885
5-pass. Tourister	2,635	2,985
5-pass. brougham	3,585	4,175
7-pass. sedan, McFarlan body	3,585	4,175

FOREIGN BATTERY PRICES

WASHINGTON, April 30—Trade Commissioner A. A. Osborne at Rome, Italy, has advised the Automotive Division of the Department of Commerce that three Italian manufacturers of batteries for the ignition and starting of automobiles have announced increases of prices as follows: Hensemberger, 5 per cent; Soaini, 10 per cent, and Tudor, 15 per cent.

Great Britain Drops Duty on Automobiles

Become Effective August 1—American Companies Prepare for Greater Business

NEW YORK, May 1—Newspaper dispatches announcing the intention of the British Government to remove on Aug. 1 all import duties on motor cars have been confirmed by advices within the industry, and plans are now being made by many American companies for marketing their lines in Great Britain as soon as the tariff is actually removed.

That the tariff will also be removed on accessories, parts and equipment is indicated in cable advices from London today stating that "budget proposal includes everything automotive."

The present duties, which have been in effect for four years and are known as the McKenna rates, imposed 33 1/3 per cent on passenger cars imported from a foreign country, with a preferential rate from Canada of 22 2/9 per cent. No duties are levied on commercial cars, trucks and tires, and the new proposal will not affect them, although the belief is held here that one result will be to end the present agitation of British tiremakers for protection on these lines.

The change will not affect Ireland, Australia, New Zealand and other British Dominions, except as they may follow the British lead.

Stimulus to Sales Expected

Shipments of vehicles from this country are expected to get under way in July, in anticipation of the change, and it is believed that the reduction will greatly stimulate sales. Actual working out of the tariff will permit reductions from the present retail prices of imported cars in England of approximately 25 per cent.

Some export managers here, who view the British outlook with the utmost optimism, are of the opinion that the British action will make possible an increase of perhaps one-fourth in their entire overseas business through the larger sales that appear certain in England.

The announcement of the tariff removal, made by Philip Snowden, Chancellor of the Exchequer, in presenting the yearly budget to Parliament on April 29, is considered here as being the most important development of the year, so far as the export section of the industry is concerned. Great Britain is the second automobile country in the world, standing next to the United States, and is now credited with having about 500,-

(*Continued on page* 1001)

Cut in Excise Taxes Approved by Senate

No Change in Measure as Reported by Finance Committee —Body Reduction Stands

WASHINGTON, April 30—One more victory in the fight for the reduction of the excise taxes on automobiles and accessories has been achieved through the action of the Senate, which has voted for substantial cuts in keeping with the expectations of the industry.

As accepted by the Senate these reductions are the same as reported by the Senate Finance Committee. There was no roll call or debate, and the ratification of the automotive section went through without mishap. Under this section truck chassis sold for $1,000 or less by the manufacturer and truck bodies sold for $200 or less, will be exempt. Those costing more will be taxed 3 per cent. The 5 per cent tax on passenger cars stands.

Parts and accessories also come in for a reduction, the Senate approving the drop to 2½ per cent.

There is a possibility of the case being reopened before the bill goes to the conference, Senator Walsh of Massachusetts having given notice that he will ask for a reconsideration because there were only twenty Senators present when the action was taken. Senator Walsh is a strong believer in the abolition of all automobile taxes, and he will, it is said, fight to bring this about.

Unless this reconsideration is given the measure, the bill will go to the conference as it stands, and it is expected that final action will be taken by the end of next week.

$12,845,650 in Taxes Collected Last Month

WASHINGTON, April 30—An increase of $672,115 is shown for the month of March, 1924, compared with the corresponding month last year in the automobile, motorcycle, accessories and excise taxes collected by the Federal Government from the automobile industry. The March, 1924, collection was $12,845,650, as against $12,173,534 in the same month in 1923.

The amount of revenue collected on automobile trucks and wagons during March was practically the same as that collected last year, but the tax from the sale of automobiles and motorcycles shows a gain of approximately $1,700,000 for March, 1924, against a $1,000,000 loss in automobile accessories and parts.

The sums collected from the automobile industry are itemized as follows: Automobile trucks and wagons, in March, 1924, $736,299, compared with $725,008 in March last year; automobiles and motorcycles, $9,777,803, contrasted to $8,070,319, and automobile accessories and parts $2,331,548, against $3,378,206.

The apparent decrease in sales of accessories, as indicated by the excise tax collected, in March of this year, compared with last, is accounted for by the fact that the Internal Revenue Bureau has changed the classification of a great many accessories, ruling them as nontaxable.

Trend of Design Toward Greater Economy of Upkeep and Operation Will Help Build Up Export Trade

AN INTERVIEW WITH WILLIAM D. LOOMIS,
Export Manager of the Gray Motor Co.,
By D. M. McDonald,
Detroit News Representative of the Class Journal Company

Detroit, April 30.

WITH the exception of two or three of the European countries, William D. Loomis, export manager of Gray Motor Co., declares the American made automobile to be without a rival in popularity in any country of the world. Everywhere markets are opening up for the American car, says Mr. Loomis, and the day is not far distant when regular shipments, particularly of the low priced lines, will be going forward to every inhabited section.

Though new to the ranks of export managers, Mr. Loomis has had extensive experience in automobile selling abroad, serving both in the departments at factories in the United States and in active representation in foreign fields. He is particularly enthusiastic over the opportunities for business in the Asiatic countries, in which he spent a large part of his time abroad, though this business, he feels, will be slower in development than in other countries which have had greater opportunities for advancement.

In Europe and the European colonies generally and in the countries of the two American continents, the automobile is already established in economic life and but awaits development to its fullest possible use. This development is going forward rapidly, states Mr. Loomis, and the export schedules of most companies for the present year are being exceeded by the demand, making necessary increases in schedules which already showed considerable increases over the previous year.

The present trend of design toward greater economy in the operation and maintenance of automobiles built in the United States is of the greatest possible advantage in the upbuilding of export business, declared Mr. Loomis. The cost of fuel in most foreign countries has been almost prohibitive as compared with American costs, but in spite of this, and the fact that design of most American cars up to the recent past have failed to consider it, export business has gone steadily forward.

Mr. Loomis does not look for any used car problem such as has been manifested in the United States in the foreign fields, principally because of the inherent thrift of the people themselves, which will result in the operation of cars by the original owners down to the last stage of usefulness. Changes in styles or models will not have the effect on the great mass of owners that similar changes have in the United States, he declares, and the car will be regarded generally for its transportation possibilities only.

Some of the countries, notably Australia, have developed used car difficulties, Mr. Loomis says, this being due in large measure to the fact that Australians are probably more like Americans in their general methods of doing business than are people of any other country. Cars have been shipped into Australia in such numbers that a used car problem was bound to arise, he says. In the older countries, however, few cars will be sold for many years on a trade-in basis.

One of the peculiar though minor problems that export managers are constantly being confronted with, Mr. Loomis states, is the inquiry and order for one car from a person, presumably a prospective dealer, in some part of the world in which the particular car is not represented. Very often these inquiries are simply a pretext for obtaining a car at dealer discounts. Treating such cases, says Mr. Loomis, he has billed the car at full list price, and where later the inquiry proves bona-fide, he has taken care of the discount in subsequent billings.

Personal representation is of the utmost importance in the export field, just as much as in the domestic territories, he declared, and probably always will be. The establishment of a dealer and care of him during his operation demands personal contact, he says. There are few dealers in any part of the world who are not helped materially by the occasional visit of a factory representative, and this, though involving high costs, works out in the long run to the material advantage of the manufacturer.

PAIGE-DETROIT EARNINGS

DETROIT, May 1—The Paige-Detroit Motor Car Co. reports net earnings of $822,904 available for the common stock for the first quarter, against $376,465 in the same period last year. The net earnings were equal to $1.37 a share earned on the 600,000 shares of common stock outstanding, after allowing for preferred dividends.

D. A. Burke Elected Peerless President

Has Been in Charge of Affairs of Corporation Since R. H. Collins Resigned

CLEVELAND, April 28—After having been the active head of the company for the last few months as vice-president and general manager, following the retirement of R. H. Collins, D. A. Burke has been formally elected president and general manager of the Peerless Motor Car Co.

The same meeting of directors re-elected G. H. Layng, vice-president; F. A. Trester, secretary, and John F. Porter, treasurer. It also reelected the executive committee, consisting of Fred R. White, C. E. Sullivan and H. E. Tremaine. Mr. White was made chairman of the board, which consists of Messrs. White, Sullivan, Burke, Layng, Tremaine, Porter and Trester, and Victor W. Sincere, G. A. Coulton, H. C. Robinson and L. J. Wolf.

In addition to these changes in the administrative personnel of the Peerless Motor Car Co., which is the operating company, the board of directors of the Peerless Truck & Motor Corp., the holding company, chose the following officers: Mr. White, president; Mr. Burke, vice-president; Mr. Layng, vice-president; Mr. Trester, secretary, and Mr. Porter, treasurer.

Sales of the Peerless company have picked up greatly in the last week. Better weather is said to have stimulated sales. Operations continue at full speed at the plant. The company is understood to be behind orders for the six-cylinder car.

Wheel Plant at Capacity on Balloon Type Tuarcs

DETROIT, April 29—The Harvey, Ill., plant of Motor Wheel Corp. is operating at capacity on balloon type Tuarc wheels, according to Harry F. Harper, general manager. The Harvey plant is averaging 500 sets of balloon tire wheels a day, this production going to jobbers and dealers for replacement business.

Company business shows a distinct trend on the part of light car owners for balloon tire equipment. The company reports shipments last week of 2100 sets for this type of car, with also a large number of shipments for medium weight cars.

The company is working full time at all plants. Truck wheel business is reported on the increase and is forming a considerable part of the output after being practically flat for several years.

COMET RECEIVER REPORT

DECATUR, ILL., April 26—The receiver's report of the sale of real estate of the Comet Automobile Co. to L. P. Halladay for $125,000 has been filed in court here, and a statement of April 18 shows $98,504 on hand. Petition for distribution of all but approximately $30,000 has been granted. This will pay about 75 per cent of the indebtedness of unsecured creditors, and it is apparent now that the final settlement will be on the basis of 100 cents on a dollar.

15 Per Cent May Be Paid to Creditors of Mitchell

MILWAUKEE, April 28—Prospects now are that the general creditors of the bankrupt Mitchell Motors Co., Inc., of Racine, Wis., will realize from 15 to 20 per cent of their claims, although nothing definite will be made known until settlement is effected of two Government claims. These include $200,000 in Federal taxes and $470,000 involving alleged overpayments relating to contracts for furnishing the Government motor trucks during the war.

It is claimed a payment of $300,000 was made to the Mitchell company under the Dent act, and Government attorneys insist the Mitchell truck contract does not fall within the scope of this act. Payment of $80,000 to Mitchell as a bonus for prompt delivery of war trucks is also asked to be refunded because it is claimed a bonus was not properly payable under the contract.

Unsecured claims against Mitchell amount to $4,250,000. The trustee holds $1,290,000, including $405,000 paid by Charles W. Nash for the Mitchell real estate and buildings. Claims for city, county and State taxes amounting to $150,000 already have been liquidated by the trustee out of sales of machinery, equipment, materials and other assets.

Midwest Truck Engine Acquired by Stoughton

MILWAUKEE, April 28—Purchase of the designs, patterns, rights and equipment for manufacturing Midwest truck engine from the Midwest Engine Co., Indianapolis, by the Stoughton Wagon Co., Stoughton, Wis., has been announced.

The Stoughton company has been using the Midwest engine as stock equipment of its line of trucks and motor buses for several years and takes over the truck engine department of the Indianapolis concern to insure future supplies and also to make possible a liberal increase in output to meet a larger production of Stoughton products.

Several carloads of machinery and tools and a large quantity of raw and semi-finished materials have been shipped from Indianapolis and installed at Stoughton. The engine henceforth will be styled the Stoughton-Midwest. The manufacture of wagons by the Stoughton company has gradually decreased as the motor truck business advanced and practically the entire works, one of the largest wagon plants in the West, is now devoted to the manufacture of trucks and buses.

G. M.'s Sales Abroad Double of Last Year

During First Quarter 17,000 Were Made, Valued at Approximately $13,500,000

NEW YORK, May 1—The international sales of General Motors cars and trucks during the first quarter of this year were practically double those of the corresponding period in 1923. This is evidenced by a statement issued by J. D. Mooney, vice-president of General Motors Corp. and president of the General Motors Export Co. It stated:

In the first three months of this year, the cars and trucks manufactured or sold overseas by General Motors numbered over 17,000, valued at approximately $13,500,000, or nearly double the 8800 valued at about $7,500,000 sold in the same period of 1923. This includes sales of Buick, Cadillac, Chevrolet, Oakland and Oldsmobile cars and G M C trucks.

This is the largest business, both in number of units and volume in dollars, ever done by General Motors Export Co. in any similar period.

General Motors has been especially active in building up a strong overseas demand for its products. Its sales and service organizations now cover the world, so that General Motors products may not only be purchased in every country but they can be serviced as well—an important factor in personal motorized transportation.

The advantages of this world-wide distribution are two-fold—not only does the motorist outside the United States derive the benefits of the enormous production methods, but American motorists reap the benefit of increased quality made possible without increased cost by the enlargement in production resulting from export orders.

While the year 1923 was regarded as a most prosperous one for the entire motor industry, both at home and abroad, all indications point to the establishment of a new record in 1924, at least insofar as oversea sales are concerned.

Cars Sold in Australia as Fast as They Arrive

WASHINGTON, April 29—American automobiles are being sold in Australia as fast as they can be shipped. Within the last month two steamships brought record loads of cars, one discharging more than 900 and the other 1500.

In a report to the Automotive Division of the Department of Commerce, Elmer G. Pauly, assistant trade commissioner at Melbourne, states that practically every car was sold before leaving the wharf.

GETS TRUSCO BRACE RIGHTS

CHICAGO, April 30—The Burgess-Norton Manufacturing Co. has acquired manufacturing and sales rights of the Trusco Brace for that territory in the United States from Denver east and for all export business.

The Trusco Brace is designed for use on Ford passenger cars and trucks.

Rumors "Ridiculous" Say Buick Officials

Greatest One, They State, Is That Involving Valve-in-Head Type of Engine

DETROIT, April 30—Buick Motor Co. officials discount any intimation that general production for the year will be seriously handicapped by the late buying season, and on the contrary are looking confidently to completing the schedule laid out for the fiscal year, which means an increase over previous year's business of about 20,000 cars.

They brand as propaganda several reports which have been given circulation, mentioning among these a purported suit for infringement of patented design, a story that four-wheel brakes have proved unsatisfactory, and that it was planned to abandon the valve-in-head type of engine. These stories, the company asserts, were circulated for unfavorable effect on sales. The report of a change in engine design is declared most ridiculous, and the company has recently issued a letter to distributors declaring its intention of confining its engine design to this particular type.

Sales Ahead of Last Year

As evidence of the company's position on actual production and sales it is stated that up to March 31 sales had run 12,000 ahead of the same period in the previous year. That includes the first eight months of its fiscal year, leaving the four best selling months of the year still to be counted. Retarded production in recent months due to factory changes, will be brought close to normal in May. This resumption of heavy production is in spite of an extreme production during the winter months which officials declare has been readily absorbed.

E. T. Strong, general sales manager, said the business of the year to date has been entirely satisfactory despite unfavorable weather conditions in practically all parts of the country. Record sales have been made in many sections, he said, and the prospect is entirely that the company will achieve fully its high expectations of the year. There undoubtedly has been much deferred business because of the weather, he said, which once started will quickly reduce the available number of cars.

Record Business in New York

Mr. Strong pointed to New York as an unfailing barometer of conditions throughout the United States. There Buick has had a record run of business and its standing in point of sales has been exceeded only by Ford. Business in the New York district has been extremely good through the winter and is continuing fully as good in April, he says. The same condition prevails in New England and the Pacific Coast, he said, where reports show a constant and healthy demand. The St. Louis territory has broken all records and so have many others including hundreds of the smaller communities.

In a statement by President H. H. Bassett, recent restricted production is ascribed to plant changes now nearing completion. Buick is now employing 23,306 men, Mr. Bassett says, a number which compares with any total the company has ever employed. The company, he states, is looking forward with every good reason to a larger business than ever before for both the ensuing fiscal and calendar year.

Factory changes that have been under way consisted of extensions and additions to the engine plant, sheet metal plant, body building plant, gray iron foundry, axle plant, forge shop, tool making plant and finished stock department. These improvements, Mr. Bassett says, will supply facilities for meeting constantly and rapidly increasing domestic and export business.

Twelve thousand more cars have been sold for the season ending March 30, than for the same period in the best previous sales year which was that of 1923, he states.

Continuing, Mr. Bassett says:

We have every reason to look forward to a more settled condition abroad now that the Dawes' report has been received and accepted. This report should mean not only a larger outlet for American motor cars, but for products of American farms and bring about better prices for these commodities. Upon a conservative estimate of the outlook at home and abroad, there is no reason to doubt a continuation of the present satisfactory conditions and future prosperity.

Convictions Returned in Case of Coast Tire

SAN FRANCISCO, April 30—Holmes Ives, former president of the Coast Tire & Rubber Co.; J. J. Eiseman, financial director of the defunct Bankers' Mortgage & Discount Co., and Alexander R. Abrams, a stock broker of San Francisco, all of whom were involved in the Coast Tire & Rubber Co. difficulties, ending in a receivership, have been convicted of conspiracy to violate the California State Corporate Securities Act, better known as "the Blue-Sky Law."

The men, with Nicholas J. Whelan, tried on the same charges, were convicted by a jury in Superior Court here. Judge Louis H. Ward sentenced Eiseman to five years on each of eight charges, the sentences to run consecutively, so that, unless the prison board interferes, he will spend the next forty years in prison.

Ives and Abrams were given indeterminate sentences, which may run as high as thirty-five years, while Whelan was fined $5,000, with the alternative of sixteen months in the county jail should he fail to pay the fine.

All the defendants gave notice of appeal. Eiseman's bail was raised from $12,500 to $40,000, which he gave and was released. Ives' bail was raised from $7,500 to $20,000, and Abrams' from $10,000 to $20,000. Whelan's bail was fixed at $5,000, the amount of his fine.

Reo Exceeding 1923 Excepting One Month

March Unit Sales Fall Behind Last Year, Although Value Is About the Same

DETROIT, April 30—In a statement on business conditions, R. C. Rueschaw, sales manager of Reo Motor Car Co., says that with the exception of March, each month of 1924 has found Reo doing a larger volume of business than was done in the corresponding month of 1923. In February this increase in business amounted to 40 per cent. During the first three weeks of April it was 12½ per cent over that of the same period a year ago.

During the month of March, said Mr. Rueschaw, although fewer actual units were sold than in March, 1923, yet due to the fact that a larger proportion of the cars sold were closed models and that a number of the units were new Reo buses at a relatively high price, the volume for March in dollars and cents was practically the same as for the month last year. Officials of the company, he states, believe that unfavorable weather and bad road conditions in the rural districts accounted largely for the slight falling off in number of cars sold in March.

Mr. Rueschaw reports a preference by buyers for the Reo Sedan equipped with genuine balloon tires. It is a recognized fact, he said, that the trend of automobile sales this spring is toward the closed car, and apparently in the direction of those cars which are equipped with balloon tires. He gives feminine preference as the principal reason for the swing toward closed models.

The Reo company is working with a full crew and is working full time. Forty-six hundred men are reported employed in the production division, a slight increase over 1923.

Racine Horseshoe Tire Voting Trust Dissolved

NEW YORK, April 28—Voting trustees of the Racine Horshoe Tire Corp. of Racine, Wis., have dissolved the voting trust and placed control of the company in the hands of the common stockholders.

This is the final step in the reorganization of the concern which has been made possible by the steady improvement in net earnings, the plant having operated at capacity since September, 1923. Profits for the last six months, it is reported, have been at the rate of 5½ per cent on the full book value of the common stock.

Coincident with the winding up of the voting trust, the holding corporation for which the voting trust has functioned, also will be liquidated and all company activities will be centered in the management of the operating company at Racine.

Men of the Industry and What They Are Doing

Rolls-Royce Officials Return

L. J. Belnap, president, and Maurice Olley, chief engineer of Rolls-Royce of America, Inc., have returned from England, where they spent some time at the factories of the parent company.

Howard Is Fisher Executive

E. C. Howard has been appointed to the executive staff of the Fisher Body Corp., according to an announcement made by President F. J. Fisher. Mr. Howard recently resigned as vice-president of the LaFayette Motor Co., with which he had been connected since his resignation from the Cadillac Motor Car Co., where for many years he served as general sales manager.

Childers Succeeds Crowell

Foust Childers has been appointed advertising manager of the Remy Electric Co. of Anderson, Ind., to succeed H. M. Crowell, who has joined the staff of the Campbell-Ewald agency. Mr. Childers has been associated with the Remy company for the last six years.

Burton C. Rogers Resigns

Burton C. Rogers has severed his connection with the Connecticut Telephone & Electric Co. after an association of twenty years. Mr. Rogers was secretary of the company in charge of sales and advertising. He has not announced his new connection as yet.

Dakin Is Factory and Sales Head

C. B. Dakin has been appointed factory and sales manager of the Michigan Pattern & Machine Works. Mr. Dakin has been associated with the automotive industry since 1911 having been connected with Oakland Motor Car Co. for four years in the productive and purchasing division, two years with Continental Motors Corp. in the purchasing department, four years with Fisher Body Co. in the purchasing and production departments and three years with the Ternstedt Manufacturing Co. as production manager.

Chalfant Heads New York Rotarians

Edward P. Chalfant, chairman of the board of the Gill Manufacturing Co. of Chicago and a director of the Motor and Accessory Manufacturers' Association, has been elected president of the Rotary Club of New York for the year 1924-1925.

Stoll Becomes General Manager

Otto E. Stoll, who for several years has been a vice-president of General Motors Truck Co., in charge of the New York branch and the eastern territory, has been brought into the factory by President W. L. Day, to become general manager. In this position he will take over some of the duties of Mr. Day. Mr. Stoll has been with the General Motors Truck Co. since its organization. His promotion to the general manager position becomes effective May 15.

Peck on Victor Motors Staff

Charles C. Peck, Jr., has been appointed assistant to the president of the Victor Motors, Inc., St. Louis truck manufacturer. Mr. Peck was formerly general sales manager of the Traffic Motor Truck Corp. and later general manager of the Diesing Motor Sales Co., Rickenbacker distributor in St. Louis.

Snow Speaks Over Radio

H. C. Snow, chief engineer of the Velie Motors Corp., Moline, Ill., delivered the first of a series of four radio lectures on automobile construction, care and handling on April 30 from station WOC. Other lectures will be given on following Wednesday nights, 7 o'clock, central time, May 7, May 14 and May 21. It is expected that an audience of 2,000,000 will hear this educational talk.

Wuchter Named Sales Manager

W. W. Wuchter, formerly president and general manager of the Nebraska Tire & Rubber Co. of Omaha, has been made sales manager of the Studebaker-Wulff Rubber Co. of Marion, Ohio.

Gullberg with Columbus Malleable

Elmer A. Gullberg, superintendent of the Union Malleable Iron Co., East Moline, Ill., the last four years and for seventeen years associated with the Deere & Co. interests, has resigned. He will leave the company May 31 and enter soon afterward upon his duties as assistant manager of the Columbus Malleable Iron Co., Columbus, Ohio.

Ill Health Retires Swallow

Leslie T. Swallow has been forced by ill health to retire as advertising manager of the Bryan Harvester Co. of Peru, Ind. Phil A. Celander, in charge of sales promotion, is filling the vacancy temporarily.

Lane Elected Vice-President

F. J. Lane, who for some time has been in charge of the Detroit sales office of the Allyne-Zerk system, has been elected vice-president in charge of sales. E. V. Harkins was elected treasurer, succeeding F. W. Ford, who recently become general manager.

J. A. Kraus Resigns

J. A. Kraus, for the last ten years advisory and chief engineer of the Garford Motor Truck Co. of Lima, Ohio, has severed his connection with that company.

Fewer Sizes Wanted by Plug Producers

Manufacturers Urging Action by Division of Simplified Practice of Government

WASHINGTON, April 30 — Feeling that needless waste in production and distribution of automobile spark-plugs is caused by the present wide diversity in sizes and dimensions, a number of spark-plug manufacturers are appealing to the Division of Simplified Practice of the Department of Commerce urging that a reduction of variety in spark-plugs will be most desirable.

As a result, the Division is taking up the question with the Society of Automotive Engineers, the National Automobile Chamber of Commerce, the Motor and Accessory Manufacturers Association, the Automotive Equipment Associaciation, and the American Automobile Association, as representatives of the several interests concerned with this problem.

The consensus of opinion shown by letters received by the Division from spark-plug manufacturers is that the present variety could be appreciably reduced with resulting benefit to the spark-plug manufacturer, the car builder, the accessory and supply dealer and to the car owner.

Four Diameters Now Furnished

Plugs, though now made in many different designs, are furnished in four principal diameters, no one of which is interchangeable with another. In addition to this diversity, each diameter is made in a number of different lengths, also in different sizes of "hex."

The majority of those replying to the inquiry favor reduction, not only in these features, but also in the diameters. Some go so far as to recommend that spark-plugs be simplified to one size thread, one size of threaded shank, one length of plug body, and one size of hexagon. It is claimed this can be done without destroying the individuality of the different makes.

Several of the manufacturers say one such plug could be adopted by all engineers. Adoption of the S. A. E. Standand ⅞ in. spark-plug, with its 18 threads per inch (U. S. Fine Thread Series), is recommended above all others. Some are of the opinion that this plug need be made in only three lengths, known as "regular," "medium extension" and "full extension" to serve all motor cars.

Simplification of spark-plug sizes and dimensions was also reported to the Division by the American Engineering Standards Committee as one of the thousand or more opportunities for simplification suggested to the A. E. S. C.

G. M. C. Last Quarter Earned $24,274,393

Net Profits Compare with $23,972,741 During Corresponding Period in 1923

NEW YORK, April 28—The detailed report of operations of the first quarter of 1924, promised by the General Motors Corp. following its recent directors' meeting, has been announced. It shows net profits of $24,274,393 after reserves for depreciation, compared with $23,972,741 in the same period last year.

After all deductions, including dividends on the preferred stock, there was a balance of $17,669,887 available for the common stock, against $17,704,119 in the same period in 1923.

The balance for the common stock in the first quarter of 1924 was equal to about 85 cents a share earned on the 20,646,327 shares of common stock outstanding. About the same amount was earned on the common stock in the corresponding period last year.

The profit and loss account shows a surplus of $132,176,113 on March 31, 1924, over and above $10 per share of no par value common stock outstanding, against a surplus of $101,840,902 reported on the same basis on March 31, 1923.

The detailed statement for the three months ended March 31, 1924, and 1923 follows:

	1924	1923
Oper. profit, etc.	$28,261,034	$27,532,964
Depreciation	3,986,640	3,560,223
Net profit from oper. and invest.	$24,274,393	$23,972,741
Less—Provision for:		
Employees' bonus	653,000	1,194,000
Due Managers Securities Co.	653,000	.....
Employees' savings & invest. fund	636,826	466,173
Interest on notes payable	152,614	165,036
Total	$2,094,640	$1,825,209
	$22,179,753	$22,147,531
Federal income taxes	2,625,000	2,670,000
Net income	$19,554,753	$19,477,531
General Motors Corp. of net income	$19,400,956	$19,406,123
7% debenture dividends	$576,303	$547,377
6% debenture dividends	912,015	911,965
6% preferred dividends	242,751	242,581
	$1,731,069	$1,701,924
Amount earned on common stock	$17,669,887	$17,704,199

TRUCK USE IN SOUTH

DETROIT, April 28—The industries of the South are operating on a sound economic basis, and optimism universally prevails, says V. H. Day, general sales manager of General Motors Truck Co., who has just returned from a trip through the Central South. Highway transportation is showing rapid growth due to the extensive road building program. A wider use of motorized transportation is certain with the establishing of substantial highways connecting mercantile centers with the producing districts.

Confidence of the Central South in its economic enterprises is most strikingly reflected at present in its flourishing building program, said Mr. Day. Business and residence building is at high points everywhere.

BLUE FAVORITE COLOR WITH MEN AND WOMEN

BALTIMORE, MD., April 28—Psychologists in convention here declare they have found from their study that blue is the favorite color of both men and women.

That women have a preference for red, not shared by men, was maintained at the convention by Prof. Roy M. Dorcus of Johns Hopkins University in an address before the Southern Society for Philosophy and Psychology on "Some Factors Involved in Color Preference."

Professor Dorcus said that men favor green as second choice and place red fourth in line while green ranks third with women who put orange, yellow and purple in next order of preference.

"Census" Meeting Called by Percy Owen for May 7

WASHINGTON, April 30—As a step toward giving the automobile industry the most complete and accurate data obtainable on the automotive industry, a conference has been called by Percy Owen, chief of the Automotive Division of the Department of Commerce.

The meeting is to be held here on May 7 and will be attended by representatives from the National Automobile Chamber of Commerce, the Census Bureau, the Bureau of Foreign and Domestic Commerce and by half a dozen of the larger exporting companies, such as Ford and General Motors.

In calling the conference Mr. Owen pointed out that there is a great need for standardization of census figures. As an example he cited the fact that it has been discovered that Ford's production figures in Canada have not been included in the production figures, although it was generally thought that the Canadian figures were included in the returns.

"What the department wants to do is to disseminate each month the figures of the industry, showing production, exports and other information," Mr. Owen states in issuing the call for the conference, "and unless we have some standards to go by the figures, as at the present time, are incomplete."

Ford Stock Earned $475 Share in 1923

Compares with $690 in Previous Year—Report Does Not State Cash on Hand

BOSTON, April 28—Net profits of $82,263,483 for the twelve months' period ending Feb. 29, 1924, are reported by the Ford Motor Co. in a statement filed with the Massachusetts Commissioner of Corporations. This is equal to about $475 a share on the 172,645 shares of $100 par capital stock outstanding, compared with $690 earned in the previous year, when profits were placed at $119,000,000.

In its statement the company lumps its "cash, securities, trademarks, accounts receivable, etc.," at $271,618,668. These items were detailed in the previous year's report, cash at the end of that year being reported at $159,605,687, securities at $37,401,605, accounts receivable at $41,938,329, and furniture and fixtures at $51,094,765. At the close of 1921, the company's cash position stood at $35,667,937.

The complete statement of the Ford company for 1924 and 1923 is as follows:

Assets	1924	1923
Real estate	$ 93,100,049	$ 86,047,010
Machinery	87,689,441	54,743,388
Merchandise	94,328,306	83,693,883
Good-will	20,517,986	20,517,986
Deferred charges	847,189	529,766
Cash, securities, trademarks, accounts receivable, etc.	271,618,668	———
Furniture and fixtures	———	51,094,765
Notes receivable	———	74,834
Accounts receivable	———	41,938,329
Cash	———	159,605,687
Securities	———	37,401,605
Patents	———	155,896
Miscellaneous investments	———	548,700
Total	$568,101,639	$536,351,939
Liabilities		
Capital stock	$ 17,264,500	$ 17,264,500
Mortgages	145,000	———
Reserves	37,436,120	———
Accounts payable	71,214,937	61,488,979
Depreciation	———	62,576,257
Deferred credits	———	388,598
Taxes	———	34,856,007
Profit and loss surplus	442,041,081	359,777,598
Total	$568,101,639	$536,351,939

Rauch & Lang Planning to Redeem Properties

CHICOPEE, MASS., April 30—The plants of Rauch & Lang, Inc., and the Springfield Coach Works have been nominally taken over by the city because of tax arrearages, but this has not interfered with operating them, and it is stated that plans are under way to redeem the properties and provide the increased working capital that is needed.

SALES SHOW SIGNS OF IMPROVEMENT

Cincinnati

CINCINNATI, April 29—Sales of passenger cars in Cincinnati are running about 5 per cent below last year. Causes of decreased sales are unfavorable weather, reduced buying power of many people here due to the poor industrial situation in machine tool and other industries, too many makes of cars on the market and also the low selling price of used cars, which influences many prospective buyers to run their old cars another year rather than get such a small allowance on a trade-in.

Stocks of new cars are generally low throughout the trade, with a shortage reported in certain models. Sales are now showing improvement, with prospects good for the next few months providing dealers show sanity in making trade-in allowances.

The used car market is in good condition, due to low prices, and stock is being moved readily. Many dealers are of the opinion that sales for the entire year may equal last year, but are somewhat doubtful about it. There are individual instances of big dealers that are way ahead of last year's record, but the majority are behind.

Philadelphia

PHILADELPHIA, April 29—New car sales as a whole are about 1 per cent ahead of this time last year, according to the consensus of opinion among dealers. Increased sales of low and medium priced cars account for the slight betterment. Cars below $1,000 are selling very well and cars up to $2,500 good. There are few sales of high priced cars, attributed to somewhat decreased general business.

Automobile trade conditions as a whole are gradually improving, dealers believe. Medium priced car sales, it is thought, will pull this year out ahead of last. Close to 20,000 cars of all kinds were sold in Pennsylvania territory in March, as against 12,726 in February.

Not more than half a dozen Philadelphia dealers are overstocked on new cars, but 35 per cent are overstocked on used cars. Dealers are figuring on better sale of used cars this year because of the tendency of numerous manufacturers to advance prices.

Kalamazoo

KALAMAZOO, MICH., April 29—Despite a backward spring, tending to throw a damper on retail automobile sales, Kalamazoo dealers as a rule are not in a pessimistic frame of mind and the general opinion is that business this year should be as good or nearly as good as during 1923.

There is considerably more sales resistance than last year, due not only to the weather but also because of a slump in local industries. To overcome this resistance more strenuous effort is being employed by every agency. There is practically no overstocking of new cars, though certain dealers report too many used cars on hand. Complaints along the latter line are from dealers who have always been extremely conservative in the matter of trade.

The feeling is general that with the coming of real spring weather business is due to pick up and should remain fairly good, despite the fact that this is a Presidential election year.

DEALERS IN SEATTLE CAUTIOUS PURCHASERS

SEATTLE, April 29—Although passenger car sales in the first three months in all lines averaged 10 per cent less than the same period last year, dealers think 1924 sales will total approximately the same as last year. Business has been spotty, with February far ahead of last February, but January and March were slower.

A slight let-up of lumber buying from California and Atlantic points has slowed up the lumber industry, but this it is believed is only temporary. Sales conditions in April are better in all lines than in March.

Standard car dealers are playing stocks pretty close, but other dealers have a surplus and all dealers are disposed to buy cautiously to keep pace with the public, which is discriminating more than in previous years. Last year dealers in standard cars were unable to fill all orders, resulting in cancellations in favor of cars other than standard make, a situation which does not prevail this year.

Cleveland

CLEVELAND, April 29—Inclement weather slowed up retail sales of automobiles in the Cleveland district from the middle of March to the present time. Dealers say the loss in trade is not alarming. Sales of cars in the first quarter in the present year as a rule were slightly lower than in the corresponding period last year, although a few dealers in lower priced cars report sales are slightly ahead of last year.

Bad weather has held sales back in April. Dealers believe that peak sales of the year are before them, and that the increase will come with better weather. Higher priced cars are not moving as well as lower priced ones. Dealers are not stocked up to an alarming extent.

Omaha

OMAHA, April 29—The passenger car sales situation in Omaha is fair in the high priced cars and good in the lower priced classes. Sales are about 10 per cent ahead of this time last year. The automobile show this year is responsible for the increase in sales. Three hundred and sixty-eight passenger cars were sold at retail during show week and orders for more than 2000 cars at wholesale were taken. An ideal spring is responsible for the increase. Thirty-six miles of paved highway west of Omaha helps.

Some dealers are overstocked in higher priced cars. Purchasers are demanding immediate delivery of lower priced cars. As a result dealers are asking manufacturers to increase their schedules about 10 per cent.

The used car situation is being taken care of by a new Omaha used car bureau. Dealers are overstocked with used cars, but expect a different situation soon.

Buffalo

BUFFALO, April 29—Excepting one make, sales of high priced new cars so far this year have run about 15 per cent less than those recorded during the corresponding period of 1923. Several dealers handling medium and low priced cars claim their sales have exceeded those made in the same period last year. A number of the dealers feel that their sales would have been heavier but for backward weather conditions. Buffalo had its real winter weather in March and has had a cold April.

Dealers are not overstocked but are all stocked heavy. High priced used cars are a drug on the market. Light low priced used cars are moving readily. Most of the dealers here seem to think the year as a whole will be satisfactory, with sales totaling perhaps 15 per cent less than in 1923.

St. Louis

ST. LOUIS, April 29—Sales here are not behind those of last year. Due to bad weather there had been a lull in the spring buying, but with the approach of warm weather sales have reached a point where they are equal to those of the same time last year. This condition exists in all lines. Dealers are not overstocked, either with new or used cars. The stocks on hand are normal, as was proved by a census taken last week by the St. Louis Automobile Dealers Association.

There are large stocks of low priced cars on hand, far larger than stocks of the same class carried last year. At this time last year dealers in low priced cars had none on hand and were from a month to six weeks behind in deliveries. The general outlook is regarded as favorable.

ALLOWANCES SMALLER ON USED CARS

Des Moines

DES MOINES, IOWA, April 29—Iowa car dealers have sold only approximately 50 per cent as many new cars during the first three months of 1924 as during the same period a year ago. The decrease was in all lines, although the medium and higher priced lines suffered the most.

March business showed some improvement, especially in the lower priced lines. Dealers report April business as unsatisfactory. All dealers show heavy stocks both in new and used cars. Despite the heavy stocks, used cars are selling fairly well.

Dealers are finding it easier to turn used cars taken in since the first of this year, due to the fact that trades since that time have been more conservative, and used car allowances decreased to the actual market value of the used car. In spite of the poor showing during the first three months of this year, dealers look forward to a good business year. Doubt is expressed as to whether last year's volumes can be equaled.

Slow business has been partly due to bad weather and poor roads. Until a few weeks ago most of the unimproved roads of the State were practically impassable. City sales have been much better than those in the smaller trade centers. Dealers are complaining of higher selling costs and factory policies, which have compelled them to take excessively heavy stocks.

Louisville

LOUISVILLE, April 29—Sales are about 20 per cent behind the 1923 sales at this time in Louisville. This is due to bad weather during March and to an accumulation of used cars which has led dealers to go slow on allowances.

Sales conditions have shown a decided improvement within the last ten days. The first warm day sales increased nearly 100 per cent, as shown by the licenses issued in Jefferson County. A feeling of pessimism which existed during March has now given way to optimism.

Dealers in low priced cars, especially Fords, are overstocked on new cars, which are just beginning to move. The used car situation is not serious enough to cause alarm, but the stock on hand is probably 25 per cent greater than at this time last year. Dealers expect prospects for sales during the remainder of this season to equal those of last year.

Detroit

DETROIT, April 29—Deliveries of new cars at retail in the Detroit district for the first three months of the year show an increase of 35 to 40 per cent over the same months last year. A large part of this increase is due to the sales of Ford cars, but outside of Fords there is an increase of 12 per cent in all lines.

ATLANTA SALES SLOW; PRICE CUTS EXPECTED

ATLANTA, April 29 — Lower priced cars continue selling well, but anything above $600 or $700 has been moving very slowly the last few weeks. Medium priced cars are only slightly less in sales volume than this time last year, though higher priced cars have fallen off to a considerable extent.

The primary reason seems to be that the public is expecting lower prices soon and is awaiting these reductions. The outlook is uncertain, although if cotton prices continue at the present level better business seems assured in May.

Dealers do not appear to be overstocked at this time and are looking for enough improvement in May to make present spring volume compare favorably with that of last year.

To a considerable extent the $1,000 car has superseded the $1,500 car in popularity, this being one of the features of the year's business to date. In this territory dealers do not complain of overstocking either in new or used cars.

Used cars are now running about 60 per cent open and 40 per cent closed. Valuations on open used cars are low and dealers declare they are losing some immediate business for this reason.

Dealers in the older and larger establishments feel there is not the activity of other years, but declare this is due more to the increase in the number of smaller neighborhood dealers than to any falling off in business. Dealers who placed contracts for cars without taking into consideration the increase in smaller dealers are finding business slower than expected.

Columbus

COLUMBUS, April 29—Sales of passenger cars are fully 20 per cent behind those of last year up to this time. This applies to all priced lines, but more especially to the medium priced cars, those selling from $800 to $2,000. With the lower priced makes the falling off is approximately 10 to 12 per cent, while in the higher priced models it runs as high as 35 per cent of the records of last year. Weather conditions are given as one of the causes, but a majority of the dealers and distributors believe that there are other potent causes such as unsettled business conditions and growing unemployment.

The used car situation, which has been slow also, is changing and a larger number are being sold.

Birmingham

BIRMINGHAM, ALA., April 29—Reports from Birmingham dealers are to the effect that sales of all grades of new cars average 15 per cent behind those of last year. Sales of high priced cars average as high as 20 per cent behind those of last year, while the lower priced makes are only about 10 per cent behind.

Local dealers attribute this to several causes, among which are slower business conditions, continued bad weather and refusal of dealers to make trades when used cars must be counted as too large a proportion of the price.

All but one or two of the dealers report that they are overstocked both on new and used cars. To remedy this they are cutting down on the number of cars they take from the factories, conducting used car sales and other special used car events and practising caution in taking used cars as trade-ins on new cars. They are unanimous in the opinion that it is better to make fewer sales on better terms than it is to make many sales and take the profits in used cars that are hard to dispose of.

Birmingham dealers believe that they will make fewer sales this year than they did last, but think that the condition will be healthy for the business in the long run. While the political situation and the fact that this is a Presidential year may have something to do with slow sales most of the dealers believe that the conditions within the business which have been described above are mainly responsible for the dullness which has been felt this spring.

Milwaukee

MILWAUKEE, April 29—A decidedly spotty situation, but not at all discouraging, is shown by a canvass of twenty-two Milwaukee dealers, most of them distributors. Packard shows an increase of 50 per cent over the first three and one-half months last year; Studebaker, 5 per cent decrease; Buick, 100 per cent increase; Chevrolet, 10 per cent decrease. Ford dealers range 10 to 25 per cent increase. Hudson and Essex increased fully 20 per cent.

The best part of the picture is the used car end, the number on hand invariably being less than a year ago with dealers exercising extreme caution in acceptance of makes and worthiness.

There is no surplus of new car stocks save in two best known makes of medium priced cars, which are moving about as well as a year ago, but not absorbing relatively greater production and deliveries. Weather conditions are probably the greatest sales resistant, and expected relief has not come. Dealers express themselves as confident of a pick-up with better weather.

Gear Meeting Draws 50 Representatives

Four New Members Elected to Association and Three Resignations Are Accepted

BUFFALO, April 28—With an attendance of about fifty representatives of gear makers throughout the country, the eighth annual convention of the American Gear Manufacturers' Association opened at the Hotel Lafayette today.

Four companies were admitted to membership, these being the Colorado Gear Manufacturing Corp., Denver; A. F. Oliver Gear & Machine Co., Buffalo; Cloyes Gear & Machine Co., Cleveland, and Foote Gear Works, Inc., Chicago. Three companies resigned and, curiously enough, all of them are in the automotive branch of the industry. The Central Products Co. gave as the reason for its resignation that it had been absorbed by the Chevrolet Motor Co. The other firms whose resignations were accepted are the Automotive Gear Works of Richmond, Ind., and the Cotta Gear Co. of Rockford, Ill.

In the report of the publicity committee, made by J. C. McQuiston of the Westinghouse Electric & Manufacturing Co., it was brought out that of forty member companies whose executive representatives replied to a questionnaire, 97 per cent advertised in one way or another, 94 per cent advertised in trade and technical papers, 6 per cent in papers of a general national circulation and 3 per cent in newspapers. Mr. McQuiston said that practically every member realized that advertising is an important feature of modern business and that the only question is whether or not the utmost results are obtained from the appropriation made.

Contributes to Lewis Fund

From the treasurer's report it appeared that the association is now on a firm financial basis. It was also brought out that the members of the association have contributed about $1,500 toward the fund being established to build and apply the Lewis gear strength testing machine. C. B. Le Page, assistant secretary of the American Society of Mechanical Engineers, who was present, said that a total of about $2,500 had been collected so far for this purpose and that the committee on gear research had given orders to have patterns and castings made for the Lewis machine.

One paper was presented at the afternoon session by Russell C. Ball of the Philadelphia Gear Works, the subject being, "What Have I Left Out? or The Value of Cost Accounting to an Executive."

INDIANA TRUCK LAW INVALID

INDIANAPOLIS, April 30 — A recent Indiana State Supreme Court decision makes it possible to resume the sale and operation of seven and a half and five-ton trucks in Indiana, the motor vehicle license bill passed by the 1923 Legislature having been declared invalid. One provision of the bill limited the maximum load and vehicle limit at 24,000 lb., except in case of special permits.

Truck fees now go back to more moderate costs, a maximum of $75 for 5-7½-ton vehicles.

March Output, 382,459; First Quarter, 1,066,080

WASHINGTON, April 30 — Figures compiled by the United States Department of Commerce place total production of automobiles and motor trucks during March at 382,459 as compared with 367,469 in February of this year and 355,030 in March of last year. Total output for the first quarter of this year amounts to 1,066,080 compared with 875,503 in the first quarter and 1,155,290 in the second quarter of 1923.

Figures for 1922 and 1923 and for the first quarter of 1924 follow:

PASSENGER CARS

	1922	1923	1924
January	81,696	223,819	287,302
February	109,171	254,773	*336,373
March	152,962	319,770	348,396
April	197,224	344,639	
May	232,462	350,410	
June	263,053	337,362	
July	225,086	297,330	
August	249,492	314,373	
September	187,694	298,911	
October	217,566	335,023	
November	215,352	284,923	
December	208,010	275,439	

TRUCKS

	1922	1923	1924
January	9,576	19,720	*28,850
February	13,350	22,161	*31,096
March	20,022	35,260	34,063
April	22,640	38,056	
May	24,097	43,678	
June	26,298	41,145	
July	22,046	30,663	
August	24,692	30,829	
September	19,462	28,638	
October	21,795	30,166	
November	21,949	28,070	
December	20,354	*27,744	

*Revised

869 Fatalities Reported for First Three Months

NEW YORK, April 29—The March report of the Traffic Planning and Safety Committee of the National Automobile Chamber of Commerce, which is compiling statistics on motor fatalities and their causes, shows that there were 264 casualties during the month as reported to it by 168 cooperating daily newspapers. Of this total fifty-two were child fatalities.

Analyzing the types of accidents, 170 were caused by the motor car hitting the pedestrian; speeding caused twenty-three, while in twelve cases skidding was the major factor. Fifty-three were attributed to adult jaywalking, and twenty-six to children walking or playing in the street.

For the first three months of the year there were 869 motor vehicle fatalities reported by the newspapers.

Chevrolet Expecting Biggest Sales Year

Dawson Returns from Two Months' Tour of Country, Optimistic Over Conditions

DETROIT, April 28—"Increased sales of Chevrolets are coming, not because prospective buyers are necessarily more numerous or more ready or more willing to buy than in the past, but because our salesmen are going after them with increased intelligence and energy," declared C. Earl Dawson, general sales manager of the Chevrolet Motor Co., following a two months' trip in which he visited all sales zones throughout the country. He was accompanied on the western half of the trip by R. H. Grant, assistant to the president, and A. R. Kroh, manager of the retail development division.

"The thing that impressed us most favorably on this coast-to-coast trip," said Mr. Dawson, "is the marked change in make-up of the men selling our cars. The salesman today is showing a very real desire to know everything he can about his product. He wants the straight of it, and we are helping him to get it all. With such a combination as this we are confident of record sales for 1924."

Mr. Dawson stated that he expected Chevrolet to go over the top this year with the biggest sales in the history of the company.

Pretentious Output Schedule

He said:

The production schedule is the most pretentious we have ever had. This has been brought about by the greater value put into the car, the increasing demand for economical transportation, the greater purchasing power of the public due to the higher value today of the Chevrolet dollar—$1.55 against $1 in 1913—and the enthusiastic support of our more than 6,000 dealers and 11,000 service stations.

While it is too early to estimate accurately just what the year holds for us in view of our tremendously increased production, there is this much that can be said: Sales are running 21 per cent better than during the corresponding period in 1923. The heavy spring and summer demand, which we have never been able to meet adequately in the past, is still ahead of us.

The industry enjoyed one of its banner years in 1922; nevertheless Chevrolet went ahead by close to 100 per cent in 1923.

Rolls-Royce Operations Reported Going Strong

SPRINGFIELD, MASS., April 30—The Rolls-Royce plant here reports business going strong, with the works operating full time and with a full force. The Boston branch is reported as making a particularly good sales showing in recent months, and the prospects in general are said to be very good.

The Massachusetts Automobile Operators Association to the number of 190 members visited the plant yesterday.

Committee Reports Bill on Section 28

Likely That Enforcement of Merchant Marine Act Will Be Delayed a Year

WASHINGTON, April 30—As a result of nationwide protest, coming from almost every class of exporting industry, against the application of Section 28 of the Merchant Marine Act, it is almost certain that the enforcement of the Act will be postponed a second time. This belief is based on the action of the House Merchant Marine and Fisheries Committee this week in favorably reporting the Newton bill which provides for an abeyance of the enforcement until May 20, 1925.

Last week, following hearings before the Merchant Marine Committee at which the automobile industry was represented by the National Automobile Chamber of Commerce, the committee added its recommendation to other protestants before the Interstate Commerce Commission, and as a result the effective date was postponed from May 20 to June 20, of this year.

Early Consideration Likely

With the Newton bill out of committee, it will be presented to the House Rules Committee, which has promised to act favorably on the measure and report out a special rule for the early consideration of the bill on the floor of the House. Once on the floor its speedy adoption is almost assured. There is also the additional possibility that the President, by executive decree, will stay the enforcement date, should Congress not have time to act favorably on it before the June adjournment.

Another indication that points to the belief that enforcement will be delayed is in the fact that although the month's delay, until June 20, was granted the Interstate Commerce Commission to rearrange the existing rail rate structure to permit operation of the Section, the commission has made no move to change the rates. This was testified to by Commissioner Haney of the Shipping Board before the House committee on Monday of this week.

The section which provides preferential rail rates to shippers using American vessels would be useless, Mr. Haney said, unless the rate structure is "molded to fit the condition which will prevail under the section."

Correspondence Exchanged

The question as to whether or not the Shipping Board has sufficient bottoms to carry on the country's commerce has been made the basis of an exchange of correspondence between T. V. O'Connor, chairman of the Shipping Board, and Henry C. Hull, chairman of the Interstate Commerce Commission. The question was gone into thoroughly, Mr. O'Connor declared, before the certified fact was made to the commission and hearings held at all ports showed that the Shipping Board has adequate facilities, Mr. O'Connor states. The authority of the commission to delay the date of enforcement, Mr. O'Connor said, is not questioned. It is indicated in the correspondence that the commission could of its own authority delay from time to time the act's enforcement.

Great Britain Drops Duty on Automobiles

(*Continued from page* 992)

000 passenger cars and approximately 150,000 to 175,000 motor trucks. The present duties have practically prevented any large scale sales of American lines, and in recent months only a few lines have been sold in any volume in Great Britain.

Ford, General Motors and Overland recently have been the chief lines from this country sold here, although, of course, such other makes as Dodge Brothers, Studebaker, Hudson-Essex, Reo and others are represented and have been more or less successfully handled. Ford, however, maintains at Manchester a manufacturing plant which actually builds Ford vehicles, more than 90 per cent of the parts being produced there.

The production last year approximated 25,000. General Motors has supplied most of the demand from Canada, with an assembly branch at London under the name of General Motors, Ltd., with its cars carrying the slogan, "Made in the Empire." Overland cars have been made in the Crossley plant at Stockport, thus escaping the duty charges. These companies accordingly will be in a different position from others, and the duty removal will affect them in a different manner.

Ford Studying Situation

Ford, it is understood, is now studying the British situation with a view to determining a future policy. General Motors, although no statement has been forthcoming from company officials, is not expected to make any change in its present plans of shipping cars from the Canadian plants. There is no indication that the change will have at least any important results in slowing up production in Canada, notwithstanding the complaints which have been made in the Dominion. A total of 11,080 cars were shipped to Great Britain from Canada last year. From the United States 7392 were shipped.

The effect upon the British motor already has occasioned some comment. About 75,000 cars, exclusive of Ford, were made in Great Britain last year and schedules called for perhaps 100,000 in 1924. Undoubtedly shipments of American cars will handle this production. One possible development discussed by automotive men here is that the British makers may go even more seriously into the manufacture of small cars, which are not made in the American lines.

Studebaker Profits Dropped in Quarter

Net Placed at $3,542,259, Decline Partly Due to Change in Charging Discounts

SOUTH BEND, IND., May 1—Net profits of $3,542,259 for the first quarter are reported by the Studebaker Corp. This total is considerably below that of the first quarter of 1923, which showed $6,170,971, but President A. R. Erskine in his statement accompanying the report explains that the profits would have been $5,400,000, or $1,400,000 more, had last year's basis of charging dealers' discounts been followed.

Mr. Erskine says:

For some years prior to this year retroactive sliding scale discounts obtained, under which profits were charged with base discounts quarterly, and with extra discounts as they accrued during the year. Maximum flat discounts were adopted this year, under which complete charges were made each quarter. Under this change, subsequent quarters, and especially the third and fourth quarters, will benefit considerably.

Business in the second quarter is proceeding in big volume and all plants are working at capacity.

Net Sales of $35,603,000

The detailed statement shows net sales of $35,603,490 in the first quarter of this year, against $43,278,454 in the same period in 1923. Profits were $4,036,620, compared with $7,085,454, and Federal taxes $494,361, against $914,483. The total surplus as of March 31 was $26,-050,493, comparable with $18,460,857. This report is based on the sale of 29,-435 cars in the quarter, against 38,411 in the first three months of 1923.

The balance sheet shows cash holdings of $5,131,187, compared with $12,578,797 on the same date last year; accounts receivable, $8,100,107, against $6,701,588, and inventories, $30,414,435, contrasted to $19,754,648. Liabilities showed notes payable, $4,000,000, against none a year ago, and accounts payable $7,127,754, against $6,194,528 last year.

The directors declared the regular quarterly dividend of $2.50 a share on the old common stock of $100 a share par value, and an initial quarterly dividend of $1 a share on the new common stock of no par value. The regular quarterly dividend of $1.75 a share also was declared on the preferred stock. All three dividends are payable June 2 to stock of record May 10. The earnings were equal to $4.52 a share on the common, against about $8 a share a year ago.

BEST DODGE WEEK

DETROIT, April 28—Reports received by Dodge Brothers show that the week ending April 5 was a record one so far as Dodge sales are concerned, 5694 cars being placed in the hands of buyers by Dodge Brothers dealers.

Shipments Overseas Gained in Quarter

Passenger Cars Shipped Totaled 39,978 and Motor Trucks Mounted to 6878

WASHINGTON, April 30—A continued forward movement in exports of automobiles and motor trucks is evident from the compilation of figures for the month of March as made by the Automotive Division of the Department of Commerce. These figures show that during the first quarter of this year cars shipped abroad totaled 39,978 as compared with 26,702 in the corresponding period of last year and that truck shipments aggregated 6878 as contrasted to 5014 for the first three months of 1923.

In March 14,035 passenger cars were shipped to overseas markets as against 13,329 in February of this year and 11,811 in March of last year. January shipments this year reached a total of 12,614.

Trucks shipped in March amounted to 2329 as against 1704 in February of this year and 1564 in March of 1923. In January of this year 2845 were sent overseas.

Details of the shipments are given in the table published below.

New A. A. A. Makes Rule on Entrance of Clubs

COLUMBUS, OHIO, April 26—After an all-day session details for the merging of the American Automobile Association and the National Motorists Association into one organization known as the New American Automobile Association were gone over at a meeting held yesterday at the Deshler Hotel. The committees from the two associations were given full power to work out the details. Thomas P. Henry of Detroit, president of the A. A. A., presided.

It was decided that all automobile clubs organized prior to the organization of the N. M. A. would be received in the New A. A. A. whether they have been affiliated with either organization, if they desire to do so. Other clubs organized in cities where either one of the two associations was represented by a club will have to come into the New A. A. A. through the original club if they desire to affiliate.

The question of the constitution and by-laws will be worked out at the annual meeting to be held in Detroit, May 9 and 10.

Riga, Latvia, Will Stage Show July 20 to August 3

WASHINGTON, April 29—The fourth international fair, in which automobile manufacturers will take an especial interest, will be held at Riga, Latvia, between July 20 and Aug. 3, 1924, American Trade Commissioner Mayer at Riga has advised the Automotive Division of the Department of Commerce.

Exports, Imports and Reimports of the Automotive Industry for March of Current Year and Total for Twelve Months Ending March 31, 1924

	Month of March				Twelve Months Ending March			
	1923		1924		1923		1924	
	EXPORTS							
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis	13,391	$9,281,202	16,396	$11,225,569	74,037	$53,820,518	122,385	$87,596,032
Electric trucks and passenger cars	16	26,239	.....	.....	230	299,067	92	128,530
Motor trucks and buses, except electric:								
Up to 1 ton	1,127	433,550	1,222	492,208	8,496	3,158,162	13,432	5,470,603
Over 1 and up to 2½ tons	367	426,335	359	471,694	2,323	2,806,395	3,240	4,171,505
Over 2½ tons	70	186,190	73	219,204	537	1,513,729	1,014	2,604,881
Total motor trucks and buses, except electric	1,564	1,046,075	2,329	1,607,518	11,356	7,478,286	20,156	13,747,287
	PASSENGER CARS							
Passenger cars, except electric:								
Value up to $500, inclusive	5,187	1,874,678	5,614	1,979,799	10,354	3,584,795	39,879	14,398,298
Value up to $800	2,521	1,718,999	4,339	2,855,607	29,859	16,000,690	26,886	17,750,951
Value over $800 and up to $2,000	3,895	4,080,152	3,847	4,070,900	20,578	21,901,711	33,143	35,411,199
Value over $2,000	208	535,059	235	666,369	1,660	4,555,969	2,163	6,077,929
Total passenger cars, except electric	11,811	8,208,888	14,035	9,572,675	62,451	46,043,165	102,073	73,638,377
	PARTS, ETC.							
Parts except engines and tires*	.....	.....	.....	.....	79,316,512	18,618,812	.....	.....
Automobile unit assemblies*	596,230	82,208	1,175,398	290,206	1,172,128	190,009	10,955,345	2,022,900
Accessories, parts*	21,433,598	4,613,203	.....	.....	3,033,463	13,507,579	125,203,670	27,913,939
Automobile service appliances (not elsewhere specified)*	123,667	85,179	416,271	146,353	186,870	120,231	2,527,545	1,147,396
Station and warehouse motor trucks	12	2,345	8	8,677	102	66,263	157	100,431
Trailers	49	34,736	29	21,704	597	257,283	371	128,913
Airplanes	3	10,818	7	19,670	29	346,430	56	314,091
Parts of airplanes, except engines and tires*	4,561	2,941	48,546	52,131	365,445	226,539	257,979	102,092
	BICYCLES, ETC.							
Bicycles and tricycles	3,169	24,720	579	14,966	15,447	124,809	16,936	175,686
Motorcycles	2,779	667,164	1,531	382,191	13,954	3,294,266	15,374	3,847,895
Parts, except tires*	240,694	149,463	363,882	189,628	1,978,117	1,058,309	2,591,994	1,357,006
	INTERNAL COMBUSTION ENGINES							
Stationary and Portable:								
Diesel and semi-Diesel	60	46,689	83	10,651	541	252,826	682	194,604
Other stationary and portable	.....	.....	.....	.....	14,729	1,781,589	.....	.....
Not over 8 H.P.	1,954	154,433	1,886	168,371	5,837	451,150	19,001	1,717,220
Over 8 H.P.	90	61,688	102	65,682	370	248,066	2,166	1,213,290
Automobile Engines	.....	.....	.....	.....	15,619	1,910,857	.....	.....
Motor trucks and buses	55	6,763	100	14,461	78	16,096	1,064	111,766
Passenger cars	6,300	639,513	3,476	514,529	9,053	1,048,246	21,600	3,219,362
Tractors	16	4,293	26	9,518	40	12,125	1,544	396,477
Aircraft	.....	.....	38	42,150	63	37,690	137	156,481
Accessories and parts*	897,656	318,682	1,091,598	443,239	5,098,533	2,117,030	6,327,772	2,727,624
	IMPORTS							
Automobiles and chassis (dutiable)	47	88,136	39	69,093	400	653,630	649	609,343
Other vehicles and parts for them (dutiable)	.....	190,574	.....	113,910	.....	739,365	.....	1,169,458
	REIMPORTS							
Automobiles (free from duty)	684	701,159	13	31,725	2,655	3,324,599	313	496,443

*Pounds.

Year's Sales So Far Beaten Only by 1923

Expected This Quarter Will Take Care of Some Deferred Business of First

NEW YORK, April 28—Weather is continuing to play an important part in keeping the spring buying movement of automobiles from getting into full swing, although it is conceded that general business uncertainty is having much to do with retarded sales. The beginning of active buying such as usually accompanies the ushering in of the spring season has been delayed a month, but a strong feeling exists that the second quarter of the year will go far toward making up for the slowing down in the first quarter which started the latter part of February and continued past the time when there should have been a strong upward movement.

While somewhat spotty conditions are existing in the sales field, reports that have been received from chief distributing points throughout the country indicate that the aggregate business done so far this year is in excess of the corresponding period in any previous year in the history of the automotive industry, with the exception of 1923, when buying was unusually heavy.

The reports show that in the larger industrial centers the volume of sales so far is greater than last year but that there has been a dropping behind from the figures of a year ago in some of the smaller industrial territories, agricultural areas and portions of the South and the Pacific Coast. In some places local conditions are contributing elements in the lowering of sales in those communities.

Makers Wait Buying Movement

Manufacturers, with a few exceptions, are not maintaining schedules at a level with those followed in March nor will they return to them until the forward buying movement has started in earnest and stocks have been depleted to a point where replenishment is mandatory to meet the demand. The fact that there has been any recession in operations has made the situation look bad until it is taken into consideration that during the first quarter of the year factories were operating at a pace far beyond that of a year ago and almost up to the mark achieved in the second quarter of last year.

Parts makers will not increase their operations until there is a stepping up in passenger-car schedules.

Although there has been a slowing up in car output, it is evident that truck manufacture is forging ahead to new marks, and that this year will see rapid advances made in this branch of the industry. The better conditions are responsible in a measure to greater bus demand, but there has been a marked improvement in the volume of orders received for motor trucks.

USED CAR AVERAGES $398 AT MOTOMARTS

DETROIT, April 30—During the first four weeks of spring the average selling price of used cars in Motomarts throughout the United States was $398.49, according to Percy Chamberlain Associates, Inc. An average of 37.6 per cent of cars brought to the Motomarts were accepted, and of the number accepted nearly 50 per cent were sold within thirty days.

"While some dealers are complaining of being overstocked on used cars," reports Percy Chamberlain, "some of our Motomarts are reporting they are unable to get sufficient used cars to take care of their demand. The outlook in cities where Motomarts have been established points to a good year for the dealers using the Appleby plan."

Cab and Meter Market Overseas Is Surveyed

WASHINGTON, April 30—A survey of the markets for taxicabs and taximeters in all major countries of the world has been made under the direction of the Automotive Division, and its results are embodied in a new publication, "Foreign Markets for American Taxicabs and Taximeters," prepared in manuscript form by the division.

It will not be printed, but made available as a loan exhibit to all inquirers, and accordingly the copies sent out in response to requests must be returned to the Automotive Division.

The survey covers forty-six leading countries, viewing them from the standpoint of sales opportunities for American manufacturers and exporters.

It is based on reports from foreign officers of the Department of Commerce and State.

HERBERT J. LOUNT DEAD

DETROIT, April 25—Herbert J. Lount, comptroller of Cadillac Motor Car Co., died here yesterday after an illness of two weeks. He had been in the service of the Cadillac company for a few months less than twenty years, starting in a clerical position and progressing through the accounting department until he became its head.

Traffic Association of G. M. Has Meeting

Talks Business, Makes Tour of New York Harbor and Pays Visit to Terminals

NEW YORK, April 28—Traffic men and directors of traffic of the manufacturing divisions of the General Motors Corp. and its affiliated companies met in New York City last week, the occasion being a session of the General Motors Traffic Association, of which Alfred H. Swayne, vice-president of the corporation, is chairman.

The object of this association is to coordinate the various traffic problems confronting General Motors as a whole in its relations with the railroads of this country and Canada as well as with ocean steamship companies.

Traffic business of the corporation was discussed Wednesday and on Thursday, as guests of the General Motors Export Co., the association was taken upon a tour of the New York harbor aboard a Lehigh Valley tug. Visits were made to the Bush Terminal in Brooklyn and the Claremont, N. J., terminal of the Lehigh Valley.

Present at Conference

Those attending the meetings were:

Chairman, Alfred H. Swayne, vice-president, General Motors Corp.; Robert S. Binkerd, vice-chairman, Committee of Public Relations, Eastern Railroads, New York; John T. Ardis, General Motors Corp., New York; F. C. Horner, General Motors Corp., New York; W. C. LeFebvre, General Motors Corp., Detroit; William Harvey, Jr., General Motors Export Co., New York; E. M. Grahn, General Motors Export Co., New York.

Morgan Goetchius, General Motors Export Co., New York; R. Bogner, Overseas Motors Service, New York; C. A. Sullivan, Fisher Body Corp., Detroit; S. J. Ryan, Fisher Body Ohio Co., Cleveland; F. J. Nemethy, Fisher Body Corp., Detroit; G. C. Conn, Buick Motor Co., Flint; A. R. Merrick, Buick Motor Co., Flint.

A. J. Shandorf, Brown-Lipe-Chapin Co., Syracuse; G. A. Main, Cadillac Motor Car Co., Detroit; C. R. Scharff, Chevrolet Motor Co., Detroit; C. F. Mowbray, Chevrolet Motor Co., Detroit; R. L. Reese, Chevrolet Motor Co., Tarrytown.

J. E. Haynes, Delco-Light Co., Dayton; T. B. Fordham, Delco Light Co., Dayton; O. C. Callison, Delco Light Co., Dayton; H. E. Boysen, Delco Light Co., Dayton; C. A. Schneider, Dayton Engineering Laboratories Co., Dayton; D. K. Banker, Dayton Engineering Laboratories Co., Dayton; A. W. Bell, General Motors of Canada, Oshawa.

E. E. Carroll, General Motors Truck Co., Pontiac; U. K. Herwick, Harrison Radiator Co., Lockport; W. R. Stendahl, Hyatt Roller Bearing Co., Harrison; J. E. Manley, Jaxon Steel Products Co., Jackson; A. L. Shaw, Klaxon Co., Newark; J. W. Peters, Lancaster Steel Products Co., Lancaster.

H. A. Grace, New Departure Manufacturing Co., Bristol; J. W. Brady, Muncie Products Co., Muncie; J. C. Haynes, Oakland Motor Car Co., Pontiac; A. J. Foster, Olds Motor Works, Lansing; L. H. Bayless, Saginaw Products Co., Saginaw and R. C. Campbell, United Motors Service, Detroit.

FINANCIAL NOTES

Parish & Bingham Co. directors have declared a dividend of 50 cents a share, the first to be declared by the company since 1920. The disbursement is payable May 20.

Hood Rubber Products Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred, payable June 1 to stock of record May 20.

Elsemann Magneto Corp. has declared the regular quarterly dividend of $1.75 a share on the preferred stock, payable May 1 to holders of record April 22.

White Motor Co. has declared the thirty-fourth consecutive quarterly dividend of $1 per share, payable June 30 to stock of record June 20.

Eaton Axle & Spring Co. reports quarterly net earnings of $113,103, after all charges, equivalent to 49 cents a share on the 229,500 shares of capital no par value stock outstanding.

Reynolds Spring Co. for the first quarter reports net income of $89,172, after depreciation, reserves and Federal taxes. After preferred dividends there was a balance of 35 cents a share on the 177,010 shares of common stock of no par value. In the same period of last year the company reported earnings equal to 51 cents a share.

C. G. Spring & Bumper Co. directors have ordered the payment of the regular quarterly 2 per cent dividend on preferred stock on July 1 to preferred stockholders of record at the close of business June 23. Also a dividend of 5 cents a share has been ordered paid May 15 to common stockholders of record on May 7. This is the second common stock dividend authorized for 1924.

Pierce-Arrow Motor Car Co. reports net earnings for the quarter ended March 31 of $378,109 after all expenses as compared with $430,527 in the corresponding period last year. After reserves for depreciation, interest and other changes, the net income was $78,729, equal to $4.99 a share on the 15,750 shares of no par value prior preference stock outstanding, against net income of $105,057, or $6.67 a share in the first quarter of 1923.

Stromberg Carburetor Co. of America, in its annual report for the year ended Dec. 31, shows net profit of $871,475 after charges and Federal taxes, equivalent to $11.62 a share earned on 75,000 shares of no par capital stock. This compares with $604,263, or $8.05 a share in 1922. Its gross totaled $1,025,327 after deductions for expenses, etc., against $770,583. After deducting $656,250 for dividends there was a surplus of $215,225. Assets of $4,326,730 was listed, including $761,949 cash, $254,727 in notes and accounts receivable and $681,732 in inventory.

Care Urged on Exporters in Naming Foreign Agents

INDIANAPOLIS, April 30—"Don't grant your foreign agency to a firm that will just sew you up and then sell the goods of a foreign competitor." This advice was given automobile exporters here in an address by Archibald J. Wolfe, chief of the division of the commercial laws of the United States Department of Commerce, before the Indianapolis Foreign Trade Conference. The subject of his talk was "Legal Service to Exporters."

Mr. Wolfe declared that the division of commercial laws has compiled, with the assistance of consular officers of the Department of State, a list of reliable law firms in the leading foreign cities. These names can be communicated to interested parties without responsibility or obligation on the part of the Government or any Government officer.

Legal proceedings, however, should be undertaken only in the last resort, in Mr. Wolfe's opinion. Ordinarily a compromise or arbitration may prove preferable. Litigation takes time, costs money and arouses enmities. The most satisfactory lawyers manage to keep the case out of courts if possible.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co. second largest bank in America.*

Continued unsettlement, with further curtailment of production schedules in some lines, was the principal feature of the business situation last week. Although trade was reported to be in smaller volume, increased firmness was noted in commodity prices.

The production of crude petroleum during the week ended April 19 averaged 1,932,350 barrels a day, as against a daily average of 1,953,350 for the preceding week and 1,945,850 for the corresponding week of last year. The situation in the petroleum industry is reported to be improving, with the decreased production and the seasonal increase in consumption.

Fisher's index of wholesale commodity prices stood at 145.8 last week as against 145.6 the week before, showing the second break in the series of declines from the year's peak on Feb. 9. Bradstreet's food index also registered a slight gain, standing at $3.17 as compared with $3.16 in the preceding week and $3.32 a year ago.

Discounts by Federal Reserve banks increased $3,300,000 during the week ended April 23. Bills bought in the open market declined $36,300,000, while holdings of Government securities increased $7,600,000. The circulation of Federal Reserve notes declined $25,500,000 and total deposits $10,700,000, while reserves increased $9,500,000 and the reserve ratio rose from 80.6 to 81.6 per cent.

Loans of reporting member banks increased $6,000,000 during the week ended April 16, a gain of $37,000,000 in loans secured by stocks and bonds being more than sufficient to offset declines of $9,000,000 and $22,000,000 in loans secured by Government obligations and "all other" loans, respectively. Investments increased $38,000,000, net demand deposits $176,000,000, and time deposits $10,000,000 while Government deposits declined $13,000,000 and borrowings from Reserve banks $63,000,000.

Increased ease was noted in interest rates last week, call money loaning at 3½ to 4 per cent, as against 4 to 4½ in the preceding week, and time loans being quoted at 4¼ to 4½ per cent.

Cash Position Good Among Tire Makers

Five Large Companies Report Conditions Better Than in Either 1919 or 1921

AKRON, April 30—While the rubber tire industry as a whole does not expect any great reduction in demand or adverse business and financial conditions, the constant reversion to such possibilities during the present presidential year has led one of the leading authorities in the industry to compile data showing that the industry is in an excellent position to weather any storm at the present time and will therefore ride any immediate disturbance with ease.

Commitments for automobile tire fabric and crude rubber which led to the difficulties of 1920 and 1921 are at a record low, it is pointed out. This is due to the constantly declining market prices which have made it unnecessary for the larger companies to cover for long periods.

Efficiency Greater Than Before

The efficiency of the factories is greater than ever before so that reductions in output would not be accompanied by the same reduction in working forces as was formerly the case. While previously the reduction of 1000 tires a day in output meant the laying off of 1000 men, this same reduction at the present time would not entail the dropping of more than 300 or 400 from the payroll.

Bank loans are low while the cash position of the larger companies is much better than in 1919 and 1920. The cash position of the rubber tire industry has been frequently viewed as one of its weaker points in the past.

At the end of the past year the five large companies here had cash amounting to $29,202,000 as compared with $3,985,000 in 1919, while inventories of the same companies at the end of 1923 amounted to only $73,209,000, while in 1919 they reached $121,566,000.

Highest Position in 1920

The five large companies reached their highest cash position in 1920 when this item in the balance sheets amounted to $42,061,000. This large sum was largely due to the cash position of the Goodyear Tire and Rubber Co. following refinancing.

The rubber industry has also learned that it is less easily affected than is the motor production industry, because although purchases of automobiles may decline, the 15,000,000 automobiles in the hands of the public continue in operation and to consume tires.

Maintenance of production schedules based upon continuance of orders indicates that the industry views the future optimistically.

Dort Now Occupying Its New Flint Plant

Built After the War, It Has Been Used as an Auxiliary Up to This Time

DETROIT, April 29—In accordance with its manufacturing plans, the Dort Motor Car Co. has removed from its original plant in the downtown section of Flint and is now operating entirely in the new plant which is located outside the downtown business zone. Negotiations for the sale of the downtown plant to Flint business interests are under way, two units already being sold. It is planned to make the old factory buildings the site of a new wholesale center for Flint.

The Dort company is in full operation in the new plant. It is making all of its bodies in one of the buildings, following out the practice of the company in this respect, as it has always made its own bodies. The new plant is described by the company as much more adaptable for its manufacturing processes than the former plant and its location in the outlying section tends toward lower taxes and economies generally.

Activities Concentrated

Sale of the old plant and the sale of the Kalamazoo body plant about a year ago place the company in the position of having all its operations concentrated in one group of buildings. The new plant, built after the war, has not been the center of Dort operations up to this time, serving only as an auxiliary. It was offered for sale at a time when the company was undecided between the operation of the two plants, but it has now been determined to sell the old and use the new.

Officers of the company report the outlook for business as good. Production has been maintained at a high figure throughout the year and has not varied 25 cars in the three months. The dealer situation is good and the company is adding to its representation. May is looked forward to being a big retail month and the company is satisfied that with better weather, business will remain good from that month on.

Independent Producers Lower Prices of Sheets

PITTSBURGH, April 30—The American Rolling Mill Co. of Middletown, Ohio, was the leader in cutting the price of full finished automobile sheets from 5.35 cents to 5.10 cents, a decrease of $5 a ton. Other independent concerns followed suit. At the same time the company announced lower prices for other grades of sheets, but this was discounted by the fact that certain makers were already selling under the new prices quoted.

The automobile sheet price was important, however, because there had not been any cutting of the price of this grade except to Ford and he had been accustomed to getting a lower price on his buying. As viewed by steel officials here, the new price will not have the effect of inducing greater buying, because it is declared that lower prices do not generally develop a better market, but rather a feeling of hesitancy and a closer method of hand to mouth buying.

The largest maker of sheets intends to maintain its price, for the present at least.

However, a difference of $5 a ton is a considerable item and must necessitate some action in the near future, although it is declared there have been few complaints from customers paying the higher price. The general buying in automobile sheets here is quiet, although one automobile interest bought a substantial tonnage in the market last week.

INDUSTRIAL NOTES

Quality Aluminum Casting Co., established at Waukesha, Wis., less than a year ago, has been compelled by the rapid growth of its business, largely from the automotive industries, to enlarge its capacity. Bids will be taken May 1 for the erection of a brick and steel foundry addition, 42 x 100 ft., which will cost about $40,000, including additional machinery and other equipment.

G. H. Kaiser and associates of Knoxville, Tenn., have purchased the plant at Chattanooga of the Dubois Rubber & Tire Co., which has been idle for some months. The organization of a new company is immediately planned by Kaiser, following which the plant at Chattanooga will be reopened, and again devoted to the manufacture of tires and tubes.

American Metal Products Co., Milwaukee, manufacturer of bearings, pistons, pins and other castings and parts from a protected bronze alloy known as Ampco bronze, is completing the construction and equipment of a rolling mill as an addition to its foundry and machine shop. A limited amount of its 8 per cent preferred stock is being offered at par, $100, to complete the required financing. This stock is redeemable after four, five and six years.

Theodore L. Dodd & Co., 80 East Jackson Boulevard, Chicago, with branch office in the General Motors Building, Detroit, has been appointed Western sales representative for the Milwaukee Lock Washer Co. of Milwaukee.

Ford Company Launches Second Steel Freighter

DETROIT, April 28—Ford Motor Co.'s second steel freighter, the "Benson Ford," will go into service July 15, taking its place with the "Henry Ford II" in service between the Ford mines in Northern Michigan and the River Rouge blast furnaces. On up-bound trips the boats will carry coal and other supplies from the terminals here to the up-state plants.

Both ships are operated by Diesel engines of the Sun-Doxford two-cycle type, which will develop 3000 hp. The "Benson Ford" is 612 ft. overall, with a 62 ft. beam and a cargo-carrying capacity of 13,000 tons.

METAL MARKETS

Automotive purchasing agents are even more reluctant to commit themselves for more than the absolutely indispensable minimum of their steel requirements than they have been earlier in April when they were by no means reckless in placing orders. Hand-to-mouth buying then was largely prompted by a desire to avoid all possibility of raw material accumulations in the event of a pruning of production schedules. To this consideration has now been added considerable uncertainty as to the future course of steel prices. The market for full-finished automobile sheets is unsettled.

Price-cutting has a poor reputation in the steel industry as a means of bringing out business, and some rollers of hood, fender, and radiator stock stuck to the unquestionably obsolete quotation of 5.35 cents, Pittsburgh, right up to the close of April, although they knew that other independents were quoting 5.10 cents. But they felt that worth-while business was simply unobtainable at any price for the time being. Purchasing agents did not relish greatly the publicity given to the price that governed the first quarter sheet buying of the leading low-priced passenger motor car interest, said to have been 4.90 at 5.10 cents.

Of course, the 4.90 cents price applied to out-of-the ordinary advantageous specifications, but some automotive consumers who had paid 5.35 cents felt rather disgruntled, and the result is that most buyers are waiting for the market to assume a more settled character before they will enter it even for small tonnages. It is quite likely that the leading interest will succeed in restoring more stable conditions by shaping its price and sales policies accordingly.

Many consumers have misunderstood the remark made by Judge Gary at the meeting of the corporation's stockholders to the effect that the abolition of the 12-hour day had "added 10 per cent to the cost of the product and is costing the Steel corporation $33,000,000 a year." The corporation produced in 1923 in round figures 15,000,000 tons of rolled and other finished steel products. The increased cost per ton would, therefore, amount to about $2.20 per ton. Increased efficiency in production is an offset that permits absorption in part at least of the added cost by the producer. So far the corporation has absorbed the entire additional cost, and enjoyed prosperity. Nor will this added cost offer a real bar to reasonable market recessions in keeping with the lessened demand. When the margin between the market price and production costs becomes so narrow that the producer is no longer able to absorb the cost added by abolition of the 12-hour day—wages will have to give way.

Pig Iron.—Automotive foundries show no interest, not even when single car lots are offered at more than attractive concessions.

Aluminum.—The "outside" market is beginning to show larger supplies, and the sole domestic producer's price is being shaded by resellers. European advices state that the Swiss producers are sold out for the moment. The Germans plan to start up the Inn works with a capacity of 40,000 tons a year, but find it difficult to compete with the Swiss and Norwegian producers, the latter being allied with the American interest.

Copper.—The market is not very chipper, although on the whole export demand is broadening. Domestic inquiry continues light.

Calendar

SHOWS

Jan. 3-10—New York, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Bronx Armory.

Jan. 24-31—Chicago, National Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

May 10-20—Madrid, Annual Automobile Show, under the auspices of the National Association of Automobile Importers, Palacio del Helo y del Automovil.

May 23-June 1—Oporto, Portugal, Automobile and Aviation Exposition, Exposition Offices, 108 rua de Santa Catarina, Oporto.

May 31-June 15—Turin, Italy, Automobile Show.

Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.

Oct. 2-12—Paris, passenger cars, motor cycles, bicycles and accessories, Grand Palais.

Oct. 17-25—London, Annual Passenger Car Show, Olympia.

Oct. 22-31—Paris, motor trucks, stationary engines, garage tools and machine tools, Grand Palais.

RACES

May 30—Indianapolis.

June 14—Altoona.

July 4—Kansas City.

Aug. 3—Lyons, France, European Grand Prix.

Sept. 1—Altoona.

Sept. 1—Syracuse.

Oct. 4—Fresno.

Oct. 19—Kansas City.

Nov. 24—Los Angeles.

CONVENTIONS

May 5-7—Cleveland, Annual Convention of the United States Chamber of Commerce.

May 6-9—Detroit, Retail Delivery, Association (Fleet Owner Convention.)

May 19-22—Detroit, National Automotive Service Convention and Maintenance Equipment Show, under the auspices of the Service Division of the National Automobile Chamber of Commerce, General Motors Building.

May 19-23—Atlantic City, National Electric Light Association.

May 21-24—Detroit, International Motor Transport Congress under the auspices of the National Automobile Chamber of Commerce.

May 26-29—Cleveland, American Society of Mechanical Engineers.

June 3-4—Detroit, Midsummer Meeting of the Automobile Body Builders Association, Hotel Statler.

June 4-6—Boston, National Foreign Trade Convention.

June 23-25—Atlantic City, American Society for Testing Materials.

June 23-25—National Team and Motor Truck Owners Association.

June—Washington, Pan American Highway Congress, under the auspices of the Pan American Highway Mission.

Sept. 7—Monza Track, near Milan, Italy, Italian Grand Prix.

Sept. 22-26—Boston, Sixth Convention and International Steel Exposition of the American Society for Steel Treating.

S. A. E. MEETINGS

May 7—Milwaukee Section, Fuels, Thomas Midgley, Jr.

May 9—Midwest Section, Fuels, Thomas Midgley, Jr., All Day Session.

May 13—Pennsylvania Section, Motor Bus Design and Operation, A. E. Hutt.

May 15—Detroit Section, How the Engineer Can Help Solve the Service Problem, H. N. Davock, Packard; O. W. Hunt, Chevrolet; W. T. Fishleigh, Ford.

May 15—Metropolitan Section, Repainting, Dr. A. H. Sabin, National Lead Co.; L. V. Pulsifer, Valentine Co., and E. M. Flaherty and E. H. Briggs, Duco.

June 24-27—Summer Meeting of the S. A. E., Spring Lake, N. J.

Oct. 21-24—S. A. E Production Meeting, Detroit.

Nov. 18-19—Joint Service Meeting of the S. A. E. with the N. A. C. C. Cleveland.

—Aeronautical Meeting at Dayton at the time of the Pulitzer Races.

January—S. A. E. Annual Meeting, Detroit.

French Export Trade Cut by Franc's Rise

PARIS, April 21 (*by mail*)—During the month of February, France exported 4736 passenger cars and 467 trucks or tractors, having a total value of 119,551,000 francs. Compared with February, 1923, this represents an increase of 53.7 per cent on the number of vehicles and of 50.1 per cent on their value.

A feature of the exports was the immense amount of business done with Germany, the number of passenger cars sent into that country being 1074 and the number of trucks sixty-four. In addition, an equal number of cars went into the Belgian-Luxemburg union, and it is quite likely that a considerable portion of these ultimately found their way into Germany. For the first time in a number of years Great Britain did not head the list of French clients.

Since February, conditions have changed to such an extent that the boom with Germany appears to have come to an end. Most of the German purchases were of a speculative nature and were made when the franc was low and in the belief that it would drop still lower. French manufacturers claimed a deposit when the orders were placed, and owing to the important rally of the franc many of the German dealers are preferring to lose their deposit rather than take delivery.

The rapid improvement of the franc is not working altogether satisfactorily for French automobile manufacturers, for already it has caused a serious cut in export business. The boom which started about last July is now practically at an end, and reduced business is expected for the greater portion of this year.

Automobile imports into France during February totaled 631 passenger cars, of which 504 came from the United States and 114 from Italy. Their value was 8,332,000 francs, or 2,927,000 francs less than in February, 1923. Only three trucks or tractors were imported.

Canadian Tire and Tube Exports Keep Declining

WASHINGTON, April 30—Canadian exports of manufactured rubber goods continued to decline during the month of February, the total value being $603,084, as compared with $829,192 in January and $876,220 in December, 1923, the Department of Commerce has been advised.

The downward trend was general for all classifications, but was particularly marked in the case of pneumatic casings and tubes and solid tires, the former falling from $481,452 in January to $337,431 in February; tubes from $61,392 to $45,579, and solids from $35,407 to $21,223 in February.

More than one-half the pneumatic tire and tube exports of Canada went to British possessions. Of a total of 29,400 casings and 28,688 tubes, the United Kingdom took 5064 casings and 2531 tubes; British South Africa, 2292 casings and 1809 tubes; Australia, 3361 casings and 2840 tubes; New Zealand, 1201 casings and 3251 tubes, and British East Indies, 1582 casings and 2352 tubes.

Argentina, Brazil, Uruguay, Japan and Denmark were also important markets. Of the total 1108 solid tires exported, the United States took 480, New Zealand 325, and the British West Indies, 200.

Farmers Buy Trucks in Atlanta Territory

ATLANTA, GA., April 30—Though there has been a marked falling off in automotive sales in the Atlanta territory the past two or three weeks, principally of higher priced cars, the truck business appears to be enjoying as healthy a volume as it has experienced in some months, with light truck sales particularly heavy, distributors report, throughout the whole of the Southeast.

The general condition of business in the section is satisfactory, and business concerns that have been holding off buying for months, waiting for just this improvement in business, are now beginning to add to their truck equipment again, with the result that the present spring volume gives promise of being materially greater than last spring.

Heavier truck sales also are better, but the biggest demand by far is for lighter delivery trucks, with the farmers proving among the good buyers. The latter also are buying heavily of tractors this season, and virtually all of the distributors report a fair improvement since the first of April, due to the increase in cotton prices. Industrial sales of tractors to the lumber industry and to factories for yard and hauling use also are reported slowly improving.

ITALIAN GRAND PRIX ENTRIES

PARIS, April 21 (*by mail*)—Twelve entries have been received up to the present for the 500-mile race to be held on Monza track, near Milan, Italy, for the Italian Grand Prix, on Sept. 7. The cars comprise four Fiats, three Mercedes, three Alfa-Romeo and two Schmids.